FLIGHT and The AIRCRAFT ENGINEER

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The Outlook

Petrol Injection

FROM the correspondence which is reaching us, some of which is for publication, it is evident that the subject of petrol injection is exercising the minds of many. The carburettor has served us well hitherto, but so did the old biplane to which we clung so tenaciously after many other nations had abandoned it for the monoplane.

We are not suggesting that the carburettor has been outclassed by direct injection, but there is a very strong feeling that the merits of the latter have not yet been fully realised and that its possibilities should be thoroughly explored. We on *Flight* hold no brief either way, although we have been accused of being unduly enthusiastic about direct petrol injection. That may be due to the fact that we were the first journal to publish an illustrated detailed description of the petrol injection system of the Junkers Jumo 211. We felt that there was sufficient to be said in favour of direct ignition to justify placing its details before our readers.

A very able case has been established for the retention of the carburettor. It is felt, however, that the article on the subject published by us recently did not include quite all the aspects. This is not the place for a detailed discussion, but we may mention quite briefly three directions in which it would appear that direct injection might score over the carburettor.

Icing-up is one of the difficulties. We are, of course, aware that long before the war experiments at Farnborough showed that the injection of a small quantity of alcohol into the carburettor would disperse the ice, but it would be idle to pretend that the trouble has been completely cured in service engines.

Then there is the question of distribution. The tendency in modern aero engines is towards a large number of cylinders, and it is by no means an easy task to ensure that each of them receives exactly the correct charge. And finally, there is the problem of starting. Modern engines run at higher speeds than formerly, and the degree of valve overlap is greater than it used to be. That increases the difficulty of starting a carburetted engine. And quick starting is often an essential quality of a modern military aircraft.

One of our correspondents mentioned in a letter published recently the troubles that may arise when the engine cuts out under negative acceleration. He could have taken the argument further by pointing out that when the engine cuts out, the airscrew goes into fine pitch, and if the pilot does not remember to close his throttle instantly (and in his preoccupation with so many other things he may be forgiven for forgetting), there is a very real danger that when the engine picks up again it will "over-rev" and damage itself.

Landplanes Over the Oceans

IT has been announced by Mr. Juan Trippe, president of Pan-American Airways, that his company has placed orders for large landplanes which will be put into service instead of the large flying boats now used by Pan-Am. It is generally held that a landplane can be made more efficient aerodynamically than a flying boat hull, mainly because its fuselage can be made a good streamline shape, while the hull of a flying boat has to have steps which break the continuity of the lines. Short Brothers in this country have partly solved this drawback by fairing the aft step.

Another argument often used by the advocates of landplanes for overseas duties is that if an aircraft alights in the open sea, such as the Atlantic or the Pacific, it will have little chance, on most days of the year, of getting off again, and that therefore a landplane with adequate flotation gear is as safe as a flying boat. That may be so, but we are not convinced, and we seem to remember that not many years ago Pan-Am. pilots

themselves reported that on most days of the year their large flying boats could be got off again after an alighting in the open sea, especially after a fair amount of fuel had been consumed.

Mr. Trippe did not disclose the name of the manufacturer with whom the order has been placed, but our guess is that, as great efficiency is obviously desirable, and the Consolidated company has already produced some amazingly efficient aircraft, that firm may be the chosen one. This is purely a guess, and we have no actual information.

It may probably be assumed that the new American landplanes will be large, perhaps of 90,000 lb. gross weight. Nothing much smaller would seem to be suitable. If that is the case, it follows almost automatically that they will have four of the new American 2,000 h.p. air-cooled engines. The assumed figure would give a power loading of 11.25 lb./h.p., which seems reasonable. For long-range work a high wing loading would be inevitable; 38-40 lb./sq. ft. would give a wing area of about 2,300 sq. ft., and an aspect ratio of 10 would give a wing span in the neighbourhood of 150 ft. The new landplanes may be put into service in 1942. We shall be interested to see how close our guess comes to being correct.

Good News

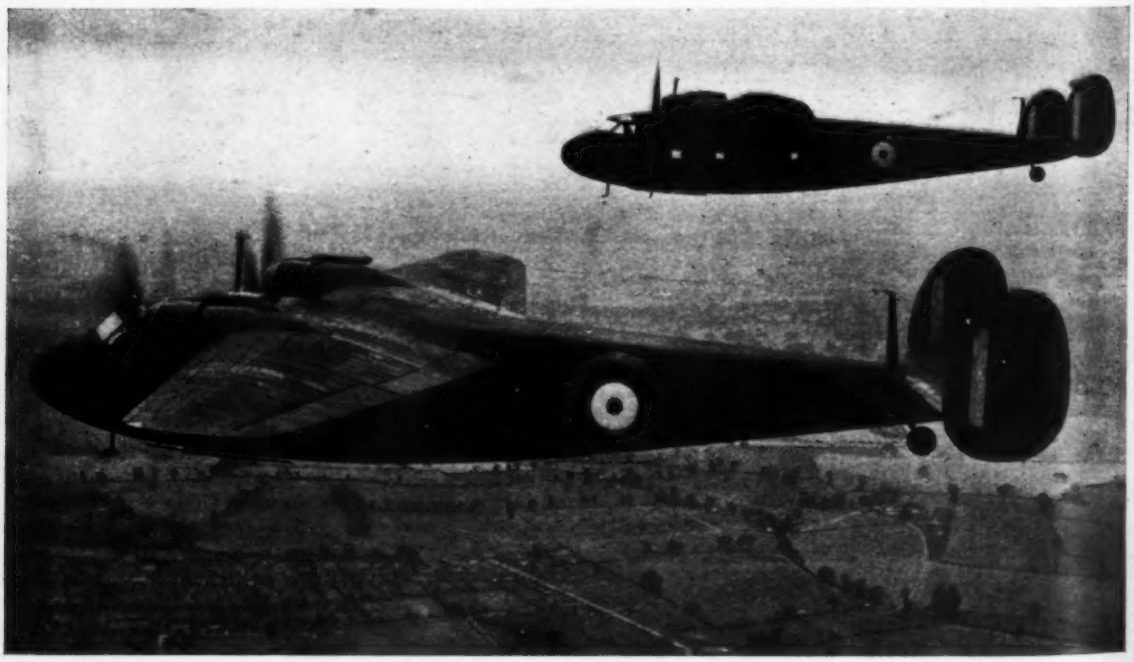
KEREN, Harar, the Yugoslav revolution—good news came thick and fast last week. General Wavell has been racing the rainy season in East Africa, and it looks as if he has won. The danger spot is the Thracian frontier of Greece, and if things had gone wrong the Germans might have had an easy march down the Vardar valley while the aircraft of the Middle East were still busy bombing the heights round Keren and elsewhere, or were waiting for the end of the rains next October. Now Italy's resistance in East Africa cannot be much prolonged, and that should mean that strong British air reinforcements will be available to harass the German columns when they advance. British troops may also be sent to Thrace, but those valleys give a great chance for determined bombing, as the retreating Bulgars found in 1918. Advancing Germans may well meet with a similar experience.

Test Pilots' Pool?

A FRIEND of ours has suggested that it might be a good thing if some scheme were brought into being whereby the teams of test pilots of the large aircraft-designing firms were partly changed over from time to time. At first the idea sounds too fantastic—and too impracticable—to be workable. But is it? One imagines that already something of the sort is taking place—unofficially. Test pilots are among the most enthusiastic, and invitations to try one another's machines are not altogether unknown.

It might be thought that there is no need for such an exchange of test pilots, and in the main there is not. The team of any aircraft firm usually finds out pretty well all there is to be found out about a new type before it goes into production. But sometimes little things seem to slip past. For instance, Service pilots are told to take off and land with the cockpit cover open. That is sound sense. But, unfortunately, in some aircraft it is almost impossible to comply with this admonition for the very simple reason that, if the belt is tight enough to be useful in aerobatics, it prevents the pilot from reaching the cockpit cover, or if he can reach it, his attitude is such that he has not the power to slide the cover forward.

Pilots usually find a way of closing the cover after the take-off. One way is to free the catch, move the cover a little, go into fine pitch and give a burst of throttle. The acceleration will then usually do the trick. But the point is that this should not be necessary, and if test pilots were interchanged occasionally, little things such as this would be found out. Service pilots can, of course, report upon such minor annoyances, but by the time they get the machines production has begun and changes are difficult to make.



COMMUNICATIVE BIRDS: A brace of graceful Flamingos which were caught on the wing by a *Flight* photographer.

War in the Air

Keren and Harar Fall: Ubiquitous Aircraft: The S.A.A.F. and the Royal Navy: H.M.S. "Formidable"

WHERE DO WE GO FROM HERE? "Poor old Benito" may not know the answer, as the popular song suggests, but this Wellington navigator in a Middle-East Bomber Squadron can be relied upon to find his way over the desert or sea—and there's no flying by Bradshaw in those parts!

KEREN and Harar have fallen into our hands. The assault on Keren had been heavy for nearly a fortnight. The town is protected by mountains on the west, many of the peaks of which rise to some 6,000 or 7,000 feet. The Indian regiments and their British comrades have been scaling and capturing these heights persistently in the face of the strongest opposition which the Italians have yet put up in Africa. Some peaks have changed hands several times, for the Italians and their Askaris made many fierce counter-attacks. Empire casualties have probably reached a higher proportion in this battle than in any other of the African engagements. The enemy fought well, and they outnumbered our forces. Naturally there are great difficulties in getting adequate artillery support for an assault in such country against prepared defences. The aircraft of the R.A.F. and the S.A.A.F. have had to take over the task of bombarding the defences, and for the last twelve days of the siege an average of ten tons of bombs a day was dropped on them. The bombing would last from dawn till dusk. South African fighter machines were also busy there, and dealt with the last feeble attempts of the *Regia Aeronautica* to keep the sky safe for Italy. After the fall of the place British armoured columns raced through Keren, one moving on towards Asmara, the capital of Eritrea, and the other in a northerly direction—no doubt with the intention of establishing a union with the other Allied column, in which is a detachment of the French Foreign Legion. The conquest of Eritrea, the oldest Italian colony in Africa, may now be taken as an accomplished fact.

Air-borne Troops

THE fall of Harar is also highly important. It is the second largest town in Abyssinia, and its capture should give us command of the railway between Addis Ababa and Djibuti.

In other parts of Abyssinia we have been using air-borne troops, accompanied by political officers, to take over outlying centres of administration, some of which are 400 miles from our lines of communication. Before the war (the enemy has without any doubt studied the *Air Force Lists* of those days) No. 216 (Bomber Transport) Squadron was stationed at Heliopolis outside Cairo, and one wonders if its machines have been used for this purpose. It would have been bad luck on No. 216 if it had not been allowed to take any part in the war, and we certainly cannot imagine any squadron being left unemployed. Of course, No. 216 can bomb as well as transport.

In the last issue of *Flight* it was stated that Jarabub seemed to have fallen without having to call on the R.A.F. for aid. Later information tells that a Lysander took part in the final battle and did yeoman service in various minor ways, though it was correct to say that heavy bombing by aircraft was not used to prepare the way for the assault. This Lysander dived down to 100 feet during the battle to drop light bombs on a stubborn Italian machine-gun post. Later, flying over the fort, the attention of the pilot was caught by a hand mirror being flashed in the sun, and he found that a party of Australians, about a dozen in number, had got isolated and they were being hard pressed by the enemy, who was bombarding them with guns. The pilot flew to another party of Australians and dropped a message telling them about the plight of their comrades. Anti-tank guns (apparently the only artillery available) were turned on to the Italian battery and soon silenced it. The pilot showed great contempt for personal danger when he came down so low through hostile fire. Lysanders have not had too many chances of distinguishing themselves in the African campaigns (or at least one has not heard of them) and when a chance comes the pilots seem to revel in risks.

Tripoli Bombed

AT first sight there seems to be no air interest about the British evacuation of El Agheila post on the coast road to the south-west of Benghazi, but it is probably one piece in the jigsaw game which Sir Archibald Wavell is playing, and in that game air, sea, and land are all dependent on each other. Just after the capture of Benghazi it seemed that the Army of the Nile was about to continue its advance into Tripolitania and push on to the frontiers of French Tunisia. Then came the German moves in the Balkans, and obviously the first necessity was to see that heroic Greece was not to be overwhelmed by an attack from the rear. At this distance one can only presume the motives of our leaders and speculate on what their actions will be; but it seems that Tripoli will have to wait for a more convenient season. Therefore, it would not be wise to have outposts permanently settled too far from our strong bases, and El Agheila is quite a long way from Benghazi—too far for hurried reinforcement in case the German mechanised columns which are now at Tripoli made an attack in force on the little post. So the Germans are allowed to have it until it suits our book to resume our advance to the west. Tripolitania is not being left undisturbed. The aerodrome and harbour at Tripoli itself

WAR IN THE AIR (Continued)

have been raided from the air on numerous occasions, and heavy bombers (we may guess that they are based on Malta, but there is no reason why they should not have come from farther afield) have raided an aerodrome at Tamet and shipping in the harbour at Sirte.

The Germans have succeeded in getting some of their aircraft across to the Dodecanese islands. The Italians seemed to have lost interest in those once-treasured possessions since the British landed in Crete, but the Germans are trying to galvanise the Axis into new life since they arrived in the Mediterranean. So the R.A.F. has resumed its raids on the islands, and a number of German machines were destroyed on the ground at Scarpanto aerodrome in a day raid. Calato aerodrome has also been raided, while a merchant ship was bombed and machine-gunned in the harbour of the island of Astropalia.

Our Newest Carrier

THE Admiralty is naturally not going to tell us how the repairs to the carrier H.M.S. *Illustrious* are proceeding in Alexandria harbour, but the statement has been permitted that another and still newer carrier, H.M.S. *Formidable*, has joined the Mediterranean Fleet and has been taking part in recent operations. She is a sister to the *Illustrious*, of 23,000 tons displacement, and mounting 4.5 inch guns. She must have accompanied the Fleet on a sweep in the central Mediterranean in the third week of March, during which one enemy reconnoitring aircraft was shot down and at least one other damaged. Presumably the fighters of the *Formidable* have been "blooded." In this connection the Admiralty has published the interesting news that by now over 400 enemy aircraft have been destroyed or severely damaged by the guns of H.M. ships, Allied warships, and the guns on merchant shipping.

While on the subject of the Navy, it is now possible to give some details of co-operation on numerous occasions between the South African Air Force and British warships off the coast of Somaliland. One of the heaviest of these bombardments was at Modun, a small town about four miles inland from the port of Brava. As soon as the target was registered by aircraft, bombardment from the sea began. The aircraft corrected the first two salvos, after which much destruction was caused by salvos from the sea. When the Italians discovered that South African aircraft were directing the bombardment, two CR42s started to attack them by diving simultaneously from astern. The rear gunner in the South African aircraft repeatedly hit one of them which dived away and landed. The second fighter was completely beaten for speed by the South African, who at once resumed his co-operation with the Navy, indicating Italian aerodromes as the target.

On another occasion a reconnaissance aircraft of the S.A.A.F. spotted for the Navy, who were engaged in the bombardment of enemy troop encampments near Brava, at the main road junction leading to Mogadishu. Spotting was extremely accurate and most of the salvos fell among tents. From the air the terrified Italian troops could be seen running from the tents and taking cover in the bush. For months past the airmen have been engaged in a constant watch on enemy shipping, which they often attacked, especially on all movements in Kismayu and Mogadishu harbours. Defences and harbours also have constantly been reconnoitred and photographed.

The case was recently recorded of a fighter pilot picking up another whose machine had been shot down and both escaping. This exhibition of pluck and resource occurred when a South African squadron attacked the aerodrome of Diredawa and destroyed ten enemy aircraft and damaged a number of others. The rescued pilot—a D.F.C. Captain—said: "When the shot hit my aircraft smoke began to pour into the cockpit and blinded me. I was forced to land and was just going to set fire to my machine and run into the bush when I noticed another of the pilots of my flight circling around and firing at enemy troops to keep them away from me. I never dreamed he would land, for anti-aircraft guns were firing at him continuously, and I was just about to rush for the bush when I heard him shouting to me. When I saw he had landed I ran as fast as I could and climbed on to one of his wings, but his engine was revving so hard that I was blown right off again by blast from the airscrew. I then tried to climb on to the pilot's back and shoulders as he was taxying back to the end of the aerodrome with the Italians firing at us all the time. We realised, however, that I should not be able to stay on clinging to his shoulders, so I climbed over his head on to his lap and got my feet on to the rudder bar. So, with enemy guns still bombarding the aerodrome, we got off. It was a pretty good take-off. I worked the stick and rudder and the pilot from underneath me operated the flap and undercarriage levers. We flew quite normally back to our base and made a successful landing."

Other pilots in the squadron who

DRESSING FOR A SHOW: A few minutes after this picture was taken in the locker-room at a Bomber Command station, these men, the crew of a heavy bomber, were on their way to raid enemy territory.

WAR IN THE AIR (Continued)

ENEMY AIR LOSSES TO MARCH 29th

	Over G.B.	Over Europe	Middle East
March 23	2	—	19
" 24	2	—	—
" 25	—	—	1
" 26	2	—	2
" 27	—	—	—
" 28	—	—	—
" 29	1	—	—
	7	0	22

Total in Northern Area, 4,330; Middle East, about 1,230.

had seen their leader with smoke pouring from his aircraft were amazed when they returned to find him safely back at the aerodrome. The pilot who made this gallant rescue of his comrade was reluctant to discuss the incident. All he had to say was, "It wasn't very comfortable with two of us in the cockpit."

Aircraft in Sea Fight

R.A.F. aircraft, as well as those of the Fleet Air Arm, took part in the naval engagement in the Ionian Sea, which has been described as the greatest sea fight of the war so far. At the moment of writing it appears that three 10,000-ton Italian cruisers and two large destroyers were sunk, while one more battleship of the *Littorio* class was damaged. At the outbreak of war Italy had two battleships of that class in commission and two more building. Of the former pair, one was hit by a Fleet Air Arm torpedo in Taranto harbour and the other by a torpedo from another Swordfish T.S.R. in the sea fight to the west of Sardinia on November 27. It seems that at least some of the Italian losses in this most recent fight were due to bombs dropped by bombers of the R.A.F. If so, the event is something of a novelty, for previously the verdict of this war has been that moving warships have little to fear from air bombs. Warships at anchor or in harbour were a different matter, and in such circumstances both sides have suffered losses—most of our losses having been during the Dunkerque evacuation, though our most serious loss, namely, H.M.S. *Southampton*, was certainly due to a German dive-bomber when the vessel was moving. The *Regia Aeronautica* has certainly done our Mediterranean Fleet no harm, but the Italian Navy cannot say the same about the attacks delivered by the Fleet Air Arm and the R.A.F. on both moving and stationary ships.

As a result of this battle, our Mediterranean Fleet, which suffered no harm during the fight, will be in a better position than ever to control the movements of shipping in the sea which Mussolini once hoped to rule. Our surplus of strength over the enemy must now be overwhelming, and in consequence it should be very difficult for the Axis to send more German reinforcements across to Tripoli. In fact, it may even be hard for the enemy to get essential supplies across. In the past the Italians doubtless piled up stores of every kind there, but it is not to be supposed that all those stores will be of use to their German friends. Their mechanised troops will need spares, and now it is very doubtful whether they will be able to get them.

Another example of the general immunity of moving warships from air attack is provided by the very unpleasant affair of the French convoy which passed through the Straits of Gibraltar in Spanish territorial waters, carrying cargoes which, it was believed, would be useful to the Germans. Not only did the French shore batteries open fire on our warships as they exercised their undoubted right to call on the convoy to stop for visit and search, but French bombers flew out and tried to bomb our ships. They failed to hit any of them. Presumably the British ships were destroyers, and they would naturally be the hardest of all marks for air bombs. The attitude of the Vichy French is indeed hard to understand. Do they really want the Germans to defeat us and enslave France for all the future? It is certainly a matter for regret that we have had to postpone our advance against Tripoli until a more convenient season, for the effect would undoubtedly be great if the French troops in Tunisia were to see the Union Jack and the banner of Free France floating on the eastern side of the defences which they prepared years ago to hold the Italians in check. Lovers of freedom may, and do, find comfort in the exploits of a Free French squadron of bombers which has been helping to hammer the Italians in Ethiopia.

Reinforcing the East

TRIPOLI will have to wait until the Greeks are out of the wood. The revolution in Jugoslavia has halted the Germans for a while, but we must also presume that the German threat to Thrace has slowed up the Greek operations against Tepelini, and to that extent brought a breathing space to the hard-pressed Italian forces in Albania. It may be that before long the Jugoslavs will have joined the gallant band of Allies who oppose the New Order of the Axis. They, and particularly the Serbs, are among the toughest fighters in Europe, and their record in the last war was as full of heroism as of tragedy. But their strength in the air is not equal to their strength and quality in land fighting—though they are possessed of some Blenheims and Hurricanes. The bulk of the air work in the Balkans will have to be done by the R.A.F.

Fortunately, although no Power can ever say that it has "enough" air squadrons, there has recently been visible proof that the United Kingdom can afford to spare squadrons for fronts outside the British Isles. The Middle East must by now have a very respectable force, including the South Africans and the Rhodesians, though it has been admitted that a risk was taken when first the Home Government decided to reinforce General Wavell and Air Chief Marshal Longmore. But only the other day it was announced that more R.A.F. squadrons, including fighters, have been despatched to Singapore. As the Governor of that Colony remarked, it is very gratifying to see that Britain could spare them, and likewise that they could be shipped there without loss from enemy action. From that fact it may be inferred that on the Balkan front, which is not the least critical front at the moment, the R.A.F. strength will be adequate for the work it may have to do. Mr. Churchill has promised both Greece and Jugoslavia that Britain will do all it can to help the fight for freedom there, and everyone will place reliance on his word. Singapore itself should now be in a position to hold its own if Japan should attempt any sudden *coup d'état*. Mr. Matsuoka will, it is hoped, have learnt something from his visit to Europe and particularly from his coming visit to Mussolini. Japanese statesmen are not usually to be hoodwinked by bombast—and even Mussolini must find it hard to talk with confidence just now. Never, we believe, has history shown a more glaring example of a bullfrog which tried to blow itself out to extravagant size and burst in the process.

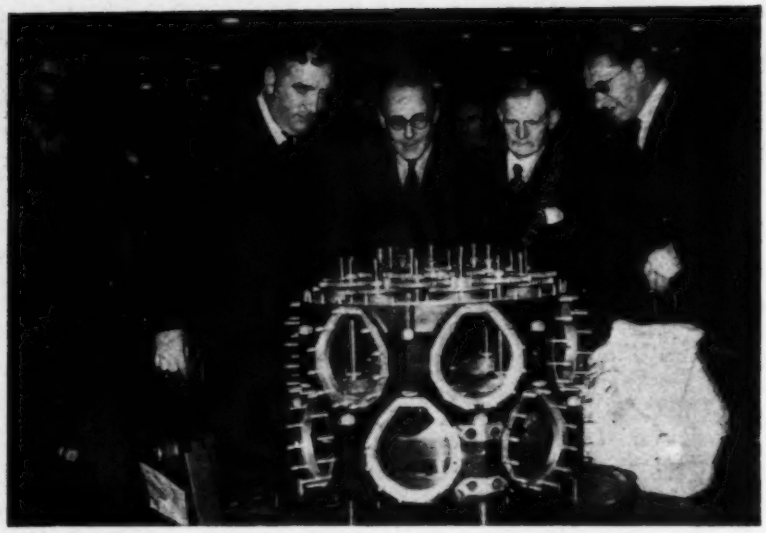
BRITISH AIR LOSSES TO MARCH 29th

	Over G.B. Aircraft	Over G.B. Pilots	Over Europe Aircraft	Middle East Aircraft
March 23	—	—	3	2
" 24	—	—	1	—
" 25	—	—	—	—
" 26	—	—	—	—
" 27	1	1	5	1
" 28	—	—	—	—
" 29	—	—	—	1
	1	1	9	4

Total in Northern Area, 1,799; Middle East, 133.

On the Northern front the weather caused a partial lull in major bombing operations. The *Luftwaffe* continued to pursue its policy of trying to assist the German blockade of Britain, and the R.A.F. seized every opportunity of hitting at military objectives in Germany and in territory occupied by the enemy.

Miss Ellen Wilkinson, M.P., Parliamentary Secretary to the Ministry of Home Security, has stated that 28,859 civilians have been killed and 40,166 seriously wounded in air raids on Britain. The number of soldiers killed in the raids is about one-fiftieth of that number.



MR. MENZIES IN THE MIDLANDS.—The Australian Prime Minister, Mr. R. G. Menzies, who it will be remembered, favoured a suggestion that the whole of Britain's aircraft industry (complete with workers and their families) should be moved to his country, recently went to Coventry and saw how that city's war industries were carrying on in spite of the Luftwaffe. In this picture he is seen, with the Mayor of Coventry and Mr. R. C. Rootes, inspecting the crankcase of a radial engine at one of the factories he visited.

Sabre and Royal Scot

IN his recent speech in the House of Commons Col. Llewellin compared the power of the Napier-Halford Sabre with that of the *Royal Scot* locomotive. This particular class of engine develops some 2,000 h.p., but its specific weight is somewhere in the neighbourhood of 90 lb./h.p. whereas one may assume that the corresponding figure for the Sabre is not far in excess of 1 lb./h.p.

Mr. Hollis Williams

IN our history of the Fairey Aviation Co., Ltd., published recently, the wording of a paragraph was such that it might be inferred that Mr. D. L. Hollis Williams was succeeded by Mr. R. T. Youngman as head of the Technical Department. Actually, of course, Mr. Hollis Williams was chief designer when he left the company to go to General Aircraft, Ltd., having previously been head of the Technical Department, and before that assistant designer.

Royal Aeronautical Society

AT the annual general meeting of the Royal Aeronautical Society held at 4, Hamilton Place, W.1, on March 29th, there was little business of importance transacted except the counting of the ballot for the election of the Council. Professor Leonard Bairstow was in the chair, and he announced that the Council for the years 1941-43 would consist of the following members: Mr. Arthur Gouge, Major E. D. Halford, Prof. F. T. Hill, Prof. G. T. R. Hill, Lt.-Col. J. T. C. Moore-Brabazon, Dr. A. G. Pugsley, Mr. N. E. Rowe, Mr. F. M. Thomas, Dr. H. C. Watts and Mr. R. T. Youngman.

The election of auditors and the consideration of the balance sheet and annual report followed. In addition to the Wilbur Wright Memorial Lecture, there had only been two lectures held in London, and this matter was discussed with a view to holding more lectures in the coming summer if possible. It was pointed out by the chairman, however, that this was a most difficult matter owing to the requirements of censorship and secrecy and the difficulty of members leaving their work to attend. He promised that the Council would again investigate the matter and see if it were practicable to hold any meetings.

Tomahawks for the Desert

CURTISS Tomahawk single-seater fighters, which were recently reported to have arrived in the Middle East for service with the R.A.F., are, according to a British United Press message, "heavily armed with cannon." Its armament was previously stated to have consisted of two synchronised machine-guns of 0.5in. and four rifle-calibre machine-guns in the wings.

The Tomahawk is one of the very few American machines to be fitted with that country's sole example of the liquid-cooled, in-line engine—the 1,100 h.p. Allison—and consequently has quite a British look about it. Its top speed is in the region of 360 m.p.h.

SHARE WITH OTHERS YOUR COPY OF *FLIGHT*

THANKS to those readers who are now sharing their copies of *Flight* in response to our appeal, we are beginning to get the desired results.

But we need to effect still greater economy in paper, so once again we urge others to follow their example and arrange, without delay, to share their copies with a fellow-reader. Remember, also, that only by placing a definite order with your newsagent can you be sure of getting *Flight* each week.

HERE AND THERE

TWA to Keep Their Stratoliners

RECENT reports that Britain was to purchase five four-engined stratoliners from Transcontinental and Western Air Inc. are now denied in *American Aviation*, which says that an official of the National Defence Commission suggested TWA should transfer the planes to us, but that they declined. In the meantime it was decided, in this country, that the stratoliners could not have been used for the desired purpose in any case but, if and when TWA were prepared to part with them, would still be purchased for use somewhere on the Empire routes.

Getting a Move On

THE speed with which British Forces move in the Near and Middle East has been a distinctive feature of the present war and now an R.A.F. squadron has created another record by shifting its complete station a distance of 300 miles within the space of three days and, what is more to the point, without interrupting its normal job of making life unpleasant for the enemy.

The wily Arabs, who fold their tents and steal silently away in the night, have nothing on these R.A.F. lads when it comes to a quick change in the scene of operations.

Big Bill Stout

TO William Stout, of Dearborn, Michegan, we are indebted for a sentence which shows how clearly he thinks: "A commercial plane is a plane which will support itself in the air financially as well as mechanically." Mr. Stout also says that every time the motor car industry has taken part in aviation it tries to adjust aviation to the automobile business and leaves aviation problems hanging in mid-air. We do not know whether we should credit Mr. Stout with that other beautiful phrase which defines the aircraft designer's problem so clearly, but it should be in big letters on the wall of every design office in the country: "Simplicate and add more lightness."

Plane Speaking!

STATISTICS relating to American aircraft output are just one big headache to anyone trying to sort out the true facts. Quite recently Mr. T. P. Wright said that it would be possible, within a year, to increase the production rate by about 600 per month. That seemed a very modest claim for a nation renowned as hustlers—too modest, some thought—but, so far, Mr. Wright hasn't been far wrong!

Now we have Dr. Van Kleffens, the Dutch Foreign Minister, stating in New York that the output of war planes in U.S.A. has been multiplied by nine since January, that by June it will be fifteen times larger and that even greater increases will follow. To use an Americanism, "We don't get it!"

BEFORE "DUNKERQUE"

The Air Component of the British Expeditionary Force

By MAJOR F. A. de V. ROBERTSON, V.D.

THE following is, we believe, the first account to be published giving the composition of the Air Component which went to France with the B.E.F., together with a short account of its doings. A good deal has been written about the A.A.S.F., and a review of a book on that subject follows

WORKING with the British Expeditionary Force in France was the Royal Air Force Component. This was quite distinct from the Advanced Air Striking Force, which was an independent force and under the operational control of Bomber Command, using advanced bases in France. The Air Component was the air arm of the Army, and was operationally under the orders of General Lord Gort, whose chief air adviser was Air Vice-Marshal Blount, the A.O.C. of the Air Component.

The Air Component comprised three classes of aircraft, squadrons of Lysanders for tactical reconnaissance, which were affiliated to Divisions and subsequently to Corps, and worked directly under the military Commanders; squadrons of Blenheims for strategical and night reconnaissance, and squadrons of fighters for the protection of the others and of the sky generally along the front of the B.E.F. The last two classes worked for G.H.Q., not for the Corps.

The composition and distribution of the Air Component was as follows:

Corps Squadrons

No. 2 Squadron at Bertangles and No. 26 Squadron at Abbeville.

Nos. 4 and 13 Squadrons at Mons-en-Chausses, near Peronne (Wing H.G. was at Athies).

Strategical Reconnaissance

Nos. 57 and 18 Squadrons at Rosières.

Nos. 53 and 59 Squadrons at Poix, near Amiens.

Fighters

Nos. 85 and 87 Squadrons at Lille. These were equipped with Hurricanes.

Nos. 607 (County of Durham) and 615 (County of Surrey) at Vitry, between Arras and Douai. At first these were equipped with Gladiators. As their names imply, they belong to the Auxiliary Air Force.

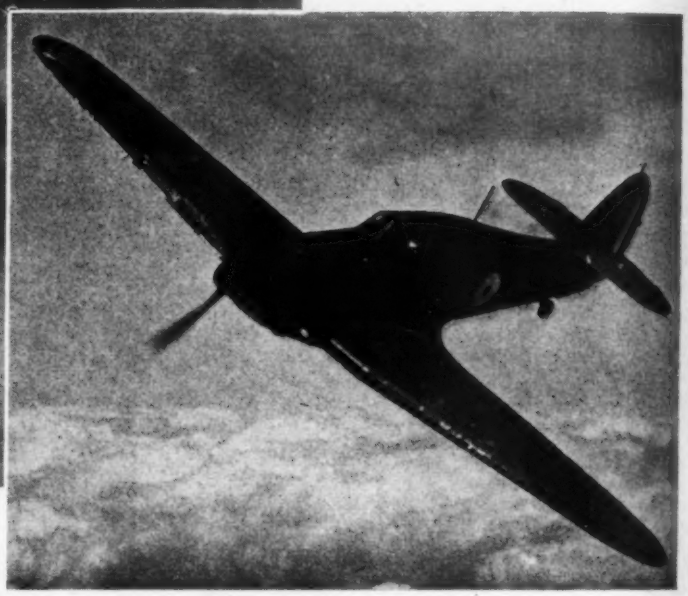
The B.E.F. was stationed opposite the Belgian frontier, and so long as Belgium remained neutral the British could do nothing in the way of engaging the enemy. The artillery could not fire, and so the Lysanders could not do actual spotting for them, though they did a lot of practice with the gunners, which was of mutual advantage. They did plenty of training flying, tactical reconnaissance, and other odd jobs such as photographing our own camouflage.

The Blenheims were more actively employed in photographing the so-called Siegfried Line, or Westwall, and this was good work well done. They had some excitement

PHOTOGRAPHER PHOTOGRAPHED: During the sitzkrieg, Blenheims of the Air Component were used extensively for photography in addition to other forms of reconnaissance.

AUXILIARY FIGHTERS: The two A.A.F. fighter squadrons with the Air Component — County of Surrey and County of Durham — were equipped with four-gun Gloster Gladiators.

STUKA STINGER: (Below) The eight-gun Hurricane I bore nearly the whole brunt of the fighting in France. Despite its hitting power and the fortitude of the pilots, the defection of the French left no alternative but retirement across the Channel.



MAIDS OF ALL WORK: (Above) Westland Lysanders, which can be used for message picking up, bombing, reconnaissance, or even fighting at a pinch, were the flying equipment of Nos. 2, 26, 4 and 13 Squadrons.

over doing it, too. Dropping bombs on Germany had been prohibited by the Cabinet, but in any case, bombing was not a primary function of the Air Component. It was for the A.A.S.F. to do that if there were any to be done, and at a later date it was the latter's Battles which bombed the Maastricht bridges and won two posthumous Victoria Crosses. When the active fighting started the Blenheims of Air Component did a great deal of highly effective bombing. The leaflet raids were carried out by the heavy machines of the Bomber Command which started from aerodromes in England.

During the severe cold in January and February, 1940, the reconnaissance work went on. The temperature was often 10 degrees below zero, and the machines stood out in the open. The aircraftmen who looked after them did heroic work in nursing and cosseting their charges, and one may imagine the aching cold in their fingers as they worked. But airmen *are* a grand lot, men who are worthy of the gallant air crews who owe everything to the work done on the ground.

Invasion of Low Countries

Serious fighting started on May 10th, 1940, when the Germans invaded Holland and Belgium. The B.E.F. marched forward with the French in the effort to hold the invaders, and the Corps Squadrons of Lysanders went with it. The Blitz (a word which has been adopted in this war to mean what was meant by "strafe" in the last war) came at an awkward moment for the fighter squadrons of the Air Component. No. 87 Squadron had been temporarily attached to the A.A.S.F., but it came hurrying back to Lille. The two A.A.F. squadrons were about to be re-equipped with Hurricanes, and the Surrey squadron had started the operation As a result some pilots were making their first flight in a Hurricane when they went into action against the enemy. Others went up in their Gladiators, and though those comparatively slow biplanes ought not to have stood a chance against the German fighters, they actually achieved some fantastic successes. But at the first German onset No. 85 Squadron had to hold the bridge alone, and it did marvellously. No. 87 Squadron came back about midday on May 10th and at once went to its help. The Durham squadron went into action for the first time with its Gladiators. On that day 49 enemy aircraft were shot down, and only one British pilot was missing, and he turned up safely two days later. Air Marshal Barratt, the A.O.C.-in-C., sent up two more Hurricane squadrons to reinforce the Air Component, Nos. 3 and 79. They came over from England and were stationed at Merville so familiar to soldiers of 1915.

Six fighter squadrons were all too few to face the German hordes, and they were worked pretty well to death. Probably some of them were literally worked to death, for men who are completely tired out cannot bring a normally alert brain into the critical work of air fighting, and a moment's slowness of thought may mean that the Me 109 gets on your tail and shoots you down. The pilots were making six and seven sorties a day and, of course, they began to get losses. In addition to those shot down, not a few Hurricanes were shot about, and there was no time to make them serviceable again. One sergeant pilot went to sleep after landing his machine, and they decided to let him sleep on till the dawn patrol next day. But at dawn they could not wake him, so they put him in an ambulance and sent him off to hospital. It took about 30 hours before he reached the hospital, and he slept all the time. The Squadron Leader of No. 85 Squadron came home once slightly wounded, and at once went to sleep, but said that he would go up again on the dawn patrol. His squadron knew that it would be almost certain death for him to try

UNKERQUE" (Continued)

to fight while in that state of exhaustion, so they put a guard on his quarters to see that nobody should disturb him until he woke naturally. Words are too feeble to describe the spirit of men who have the will to fight on in such circumstances. One just feels thankful that Britain can still produce them.

With the advance into Belgium and the subsequent retirement the Lysanders came into their own. The guns were at last firing live shell against the enemy and the Lysanders could spot for them, besides doing their reconnaissance. They had their losses, of course, for there were certainly not enough fighters to give them adequate protection. But they were full of spirit, and they have a sting in their tail. That sting consists of only one machine gun, worked manually by an air gunner, but those air gunners are full of pluck and are fine shots. In one encounter a Lysander shot down two Me 109s and came home triumphant, though very much the worse for wear. The C.O. of the squadron exclaimed, "I don't believe it!" and in good truth it sounds impossible. But both the German fighters had come down on our side of the line and the wreckage could be produced in evidence.

When it became obvious that the B.E.F. would have to be evacuated from France (if possible—the prospects did not seem good) the Air Component was ordered back in advance of the Army troops. They embarked their men and what equipment they could save at Boulogne and got across, while such aircraft as were able to fly flew the Channel. At once they turned about and commenced to operate from Hawkinge. The Lysander squadrons were given the task of dropping food, water and ammunition on the gallant self-sacrificing garrison of Calais. This enabled the battalions of Rifles to prolong their resistance, and no doubt eased the last hours of life for those who fell.

The fighter squadrons of the Air Component suffered heavily but won great victories. No. 3 Squadron, for example, in eleven days of the fierce fighting in France destroyed 60 enemy aircraft, 11 of them in two days. The other squadrons were equally gallant.

The Air Force in France Command

In conclusion, a few words may be said about the institution of the Command, the R.A.F. in France, under Air Marshal Barratt. It combined under one A.O.C.-in-C. the Air Component and the Advanced Air Striking Force. For the latter it was obviously an advantage to have someone on the spot to issue orders, instead of remaining under the Bomber Command with H.Q. in England. The A.O.C.-in-C. could also attend to matters of organisation and equipment which concerned the Air Component, such as promotions, and it was recorded above that when the emergency came he reinforced it with two fighter squadrons. For ordinary operations, however, things went on much as they had gone before with the Air Component, A.V-M. Blount continuing to act as the air adviser to Lord Gort and issuing orders to the Component's squadrons. A.V-M. Blount had spent most of his service life in army co-operation, and his death in a flying accident after the Dunkerque evacuation was a severe loss to that branch of the R.A.F.

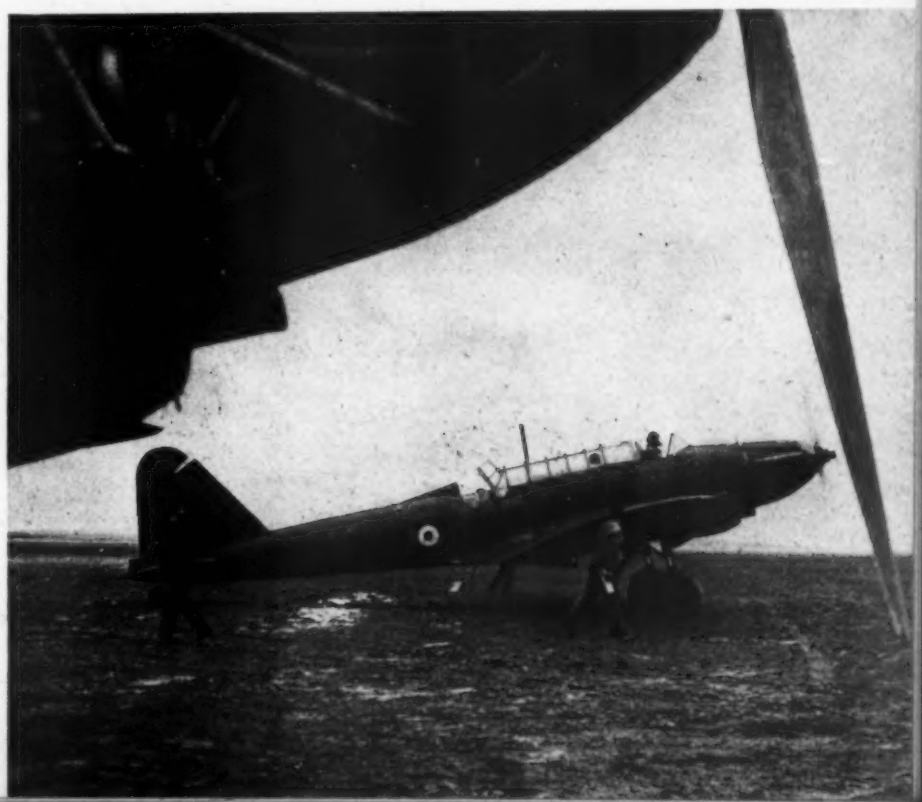
Now we have an Army Co-operation Command with the experienced Air Marshal Barratt as A.O.C.-in-C., and we may hope that next time a B.E.F. takes the field there will be no need to improvise new organisations in the middle of a campaign.

THE ADVANCED AIR STRIKING FORCE

THERE has been something like a spate of books published about the Advanced Air Striking Force which went to France what time the Maginot Line and the Westwall governed the situation on the western front. Of these books that of Charles Gardner, the B.B.C. observer, is by far the best which we have read. Not only is it the best written and the most readable, but its author is a man with knowledge of aircraft and of the Royal Air Force. In addition, he shows comprehension of what it means (or should mean) to be a war correspondent, whereas some of the other journalists who were attached to A.A.S.F. merely regarded themselves as Fleet Street reporters out for a story. The easiest way to get a story was to pick on one fighter pilot (it had to be a pilot of a fighter squadron—bomber squadrons were ineligible) who was more successful than his fellows and mention his name as often as possible. It was almost a *sine qua non* that this hero should have a nickname. "Cobber" Kain filled the bill.

THE ADVANCED AIR STRIKING FORCE. *By Charles Gardner. (Hutchinson and Co. 7s. 6d. net.)*

The R.A.F. in France started as two separate units, the Air Component of the B.E.F. which was with the Army along the Belgian frontier, and the A.A.S.F., which was centred at Reims with A.V-M. Playfair as its A.O.C. The latter was at first a detached (so to speak) Group of the Bomber Command. Afterwards the two were combined



STRIKING FORCE STRIKERS: Ten Squadrons of the A.A.S.F. in France flew Fairey Battle medium bombers. Two V.C.s were won by No. 12 Squadron.

THE ADVANCED AIR STRIKING FORCE (Continued)

into a Command, the R.A.F. in France, under Air Marshal Barratt as A.O.C.-in-C.

Heavy night-bombing squadrons were kept by the Bomber Command in its own hands, and worked from aerodromes in Great Britain. The A.A.S.F. was composed of medium bomber squadrons, flying Fairey Battles. They were organised in two Wings, and were supported by three Air Stores Parks and three Salvage Units. For protection they were given two fighter squadrons (Hurricanes), Nos. 1 and 73. Mr. Gardner is, we believe, the first writer to give the composition of the A.A.S.F., and he puts it very neatly in diagram form. The following were the bomber squadrons and their stations:—

No. 12 Squadron	Amifontaine
No. 103 Squadron	Bethenville
No. 142 Squadron	Berry au Bac
No. 218 Squadron	Auberive
No. 226 Squadron	Reims
No. 88 Squadron	Mournelon
No. 114 Squadron	Condé
No. 139 Squadron	Plivot
No. 105 Squadron	Villeneuve
No. 150 Squadron	Ecury

The two fighter squadrons were stationed, No. 73 at Rouvres, not far from Verdun, and No. 1 at a village near Bar-le-Duc. Afterwards, when the Germans broke through at Sedan, three more fighter squadrons, Nos. 17, 242 and 501 (County of Gloucester), were sent up to reinforce the A.A.S.F. No. 501 came out about May 10 and the other two about June 11. By that time the whole of the A.A.S.F. had fallen back to aerodromes in the Troyes area.

The earlier chapters of this book are filled with anecdotes and personal experiences, all of which make very pleasant reading. One hears of personal difficulties in "getting my stuff through," of disagreements with the censors, of a little home set up in Paris with Mrs. Gardner and Master Umbrage Gardner installed in it, and such matters. A number of broadcasts are reproduced, some by R.A.F. officers. When the "Blitz" started on May 10, Mr. Gardner deals with it by reproducing his diary, and so gives a vivid picture of what things were like in one part of France, producing an effect which could hardly be achieved otherwise. One applauds his judgment in doing this.

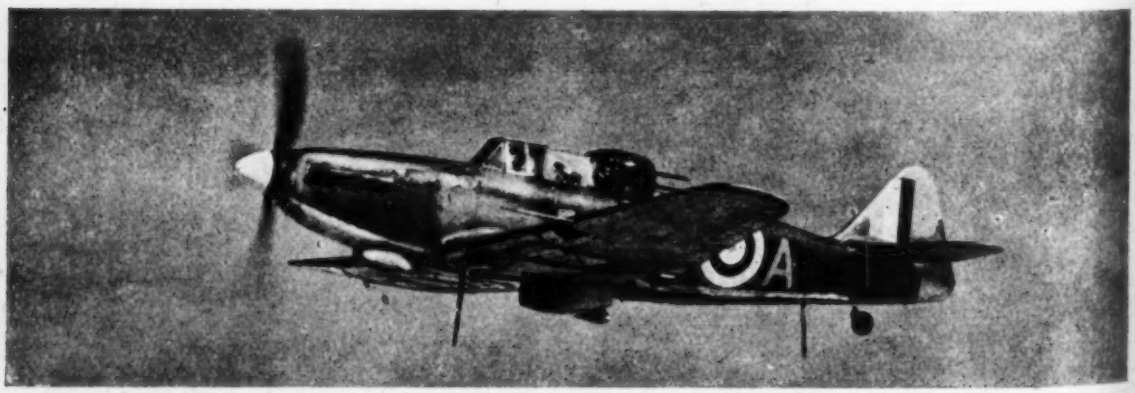
Actually, however, one's respect for Mr. Gardner as a war correspondent is really aroused by his summary and Appendices at the end of the volume, and those readers who seek historical instruction rather than mere amusement would be wise to read them first. He divides the active life of the A.A.S.F. into four phases: (1) May 10 to 16, when the Battles did day bombing from their prepared bases round Reims and suffered heavy casualties. It was on May 12 that No. 12 Squadron bombed the Maastricht bridges and won the first two Victoria Crosses of the R.A.F. war—both posthumous; (2) May 17 to June 10, day and night bombing from the Troyes and Southern Champagne area, and (after June 2) from bases in the Loire valley; (3) June 10 to 15, day and night attacks on the Germans on the lower reaches of the Seine and Somme, the fighters mainly engaged in the Somme area. On June 15 the Battle squadrons left for England; (4) June 15-18, the five fighter squadrons covered the embarkation of B.E.F. units at the western French ports. The squadrons were based on Nantes.

Battle Raids

Mr. Gardner expands these phases and has some very pertinent observations to make. He mentions, for instance, the controversy between day bombing and night bombing by the Battle squadrons. During the "bombing truce" they had made some experiments in night bombing, but accidents had been numerous, and the crews felt that the Battle was not suitable for the job and wanted to stick to day work. They concentrated on low-flying attacks in conjunction with land forces. But when they had to face the German A.A. defences by day their casualties were so heavy that there was a swing round in opinion. Mr. Gardner gives figures: Between May 10 and June 15 the Battles flew on 996 raids, 528 by day and 468 by night. The day casualties were 100, or 19 per cent., while the night casualties were 5, or 1.07 per cent. He does not say how far the night sorties were effectual. Many of the targets, such as bridges, were so small that it was necessary to attack them by day. Up to the end the Battle pilots went for their objectives with all the courage typical of the R.A.F., but by the middle of June it was clear that the Battle of France was lost, and so the squadrons were sent home. Mr. Gardner comments: "The main lesson learnt from the unhappy experiences of the A.A.S.F. was that accurate attack against small and well-defended targets is bound to be costly—particularly so when aircraft are called upon—as the Battles were—to do the work which infantry and artillery had failed to do." This reflection seems to us to go to the root of the matter. Only in special cases, such as the campaign in East Africa, is it wise, or even legitimate, to use aircraft to do the work of field artillery. But sometimes the devil drives.

Mr. Gardner gives some interesting examples of tactics used by German fighters, and he also describes the clever surprise tactics used by the Defiants during the Dunkerque evacuation. He concludes: "The Defiant was the weapon which Britain produced from up her sleeve at a time when the world thought the sleeve to be empty, and, if the Defiants never come off again, at Dunkirk they did their bit."

A very valuable book. May this war produce more publications of equal importance.



Dunkerque Defiance: ". . . the weapon which Britain produced from up her sleeve."

Topics of the Day

STRANGE INTERLUDE

Some Aerodynamic Effects, Peaceful and Otherwise : A Much-needed Flap Modification

IT is probably a sign of advancing age, but I am continually finding myself thinking of discussions and adventures which took place during the comparatively palmy days of peace. Long, long ago, before military types meant much more than the pictures in the Technical Press, I had a long discussion with two earnest and intelligent designer people about the actual and apparent effects of raising the flaps. I don't doubt that all designers are intelligent and earnest, but these two were particularly so because they continued to work very largely for fun and certainly not for profit—of which there was little or none.

Anyhow, in the course of this discussion I obstinately refused to agree that an aeroplane did not actually sink when the flaps were raised, or that the results of such raising could be entirely nullified by a suitable and rapid change in the incidence of the wings—in other words, by pulling sharply back on the control column at a critical moment. I remember that the discussion ended with a promise that I would (at their financial and my personal risk) raise the flaps when flying quite near the ground while they watched and/or recorded the results on a cine film.

The war, fortunately, or unfortunately for me, put an end to such experimental ideas, but the question repeatedly crops up, and I sometimes feel that it would be a good thing if that film could be made. Using, instead of a small aeroplane, a large machine with particularly vicious ideas in this respect and with a suitable modification to provide instantaneous change of trim, but with a history which would reduce heartburnings in the almost certain event of complete loss.

Wool-gathering

Before attempting such an experiment I would take the same machine up to a safe height with the upper surface of the wing covered with little tufts of wool and with the fuselage filled with cameramen. The inevitable write-off would be reserved until all possible information had already been obtained. When the wreckage had been cleared away and myself and crew had been whisked off to hospital, the experts could then set about the business of designing some safe flaps.

Though why, in anyone's name, no one has thought fit to copy Mr. Fred Miles' idea of long ago I have no means of knowing. Mr. Miles, as most of us remember, devised a perfectly good system on the Monarch by which the flaps automatically returned, when the throttle was opened beyond a certain point, to a position which removed most of the drag while retaining the lift. I've forgotten the figure for the critical angle, but the fact remains that the flaps came up to this angle without any appreciable sink by the machine, but with a marked diminution of drag. Anyone who has handled really large machines in emergency conditions, after a foozled or obstructed approach, will know what I am after. The pilot who does not sweat during the first part of such an emergency circuit is without imagination.

I've got an idea that I can explain this very real loss of lift and height. My explanation is certainly not new—I should be surprised if it were—but it is surely time that someone acted on it. Has anyone thought of the effect of flap-raising in terms of the airflow over the upper wing surface? My idea is that this flow is actually and completely broken for a second or so and that during this period the wing loses most of its lift. Experts have my permission to translate my coarse words into formulæ relating to boundary layers and what not, but that is the fact as I see it. Hence my interest in wool tufts. I should not be in the least surprised to see most of them standing on end like my own hair when the flaps are raised.

In the majority of machines the flaps go down quite slowly, so the natural reversed effect is not very noticeable. Even so, whether the trim is changed one way or the other by their application there is a distinct "humping" motion at the moment of application. Again, a restricted return system for the flap hydraulic lines reduces the intensity of the sink and in some cases removes it altogether.

Whereas when the flaps are lowered the turbulent "vacuum" (to use a dated word) behind the trailing edge compresses the air over the upper surface and gives increased lift, when the flaps are raised there is a sudden surge of air backwards and upwards behind the edge, and this surge "lifts" the flow over the whole of the rear part of the upper wing surface. The result is a sudden stalling phenomenon entirely similar to, but faster in action than, that normally experienced as speed is reduced. I have often watched the movements of loose pieces of fabric on or behind the upper leading edge. You can positively see where the lift is disappearing. At the moment of landing, for instance, the fabric which covers the gun holes in the leading edge will start to flap, yet even then the machine is not quite fully stalled.

Where Work is Done

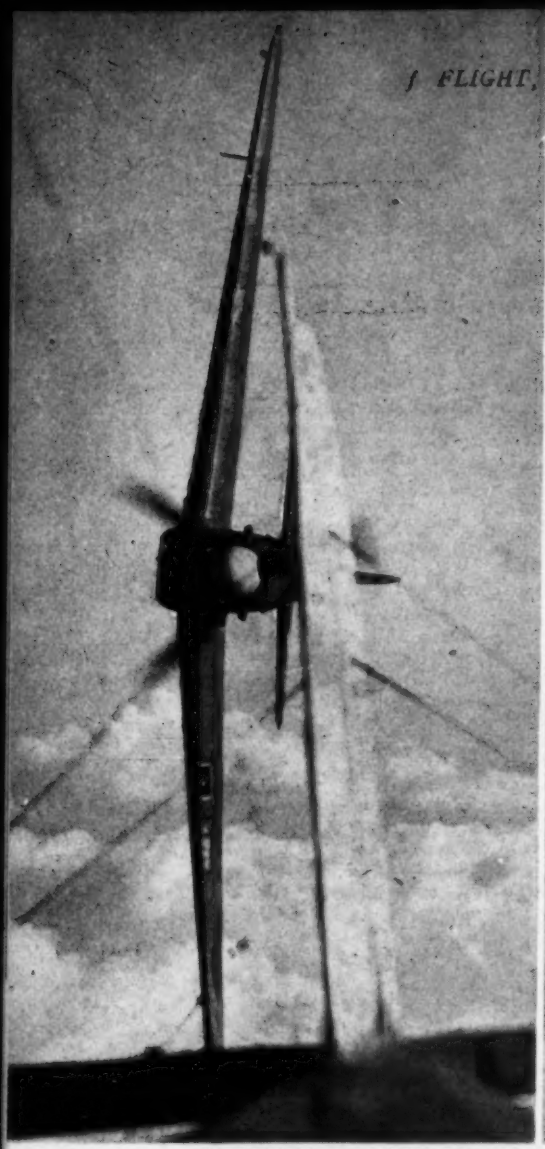
A loose gun-cover at the rear of the wing will have little or no effect on the stalling characteristics, because that part of the wing is ceasing to do any useful work long before its spoliation would cause excitement, yet a similar failure in the forward area will increase the stalling speed on that side by nearly 20 m.p.h. or more—with most unpleasant results. A completely loose cover on the leading edge itself—noticed during the take-off—will remain firm throughout a flight, yet will fall off just as the machine is touching down.

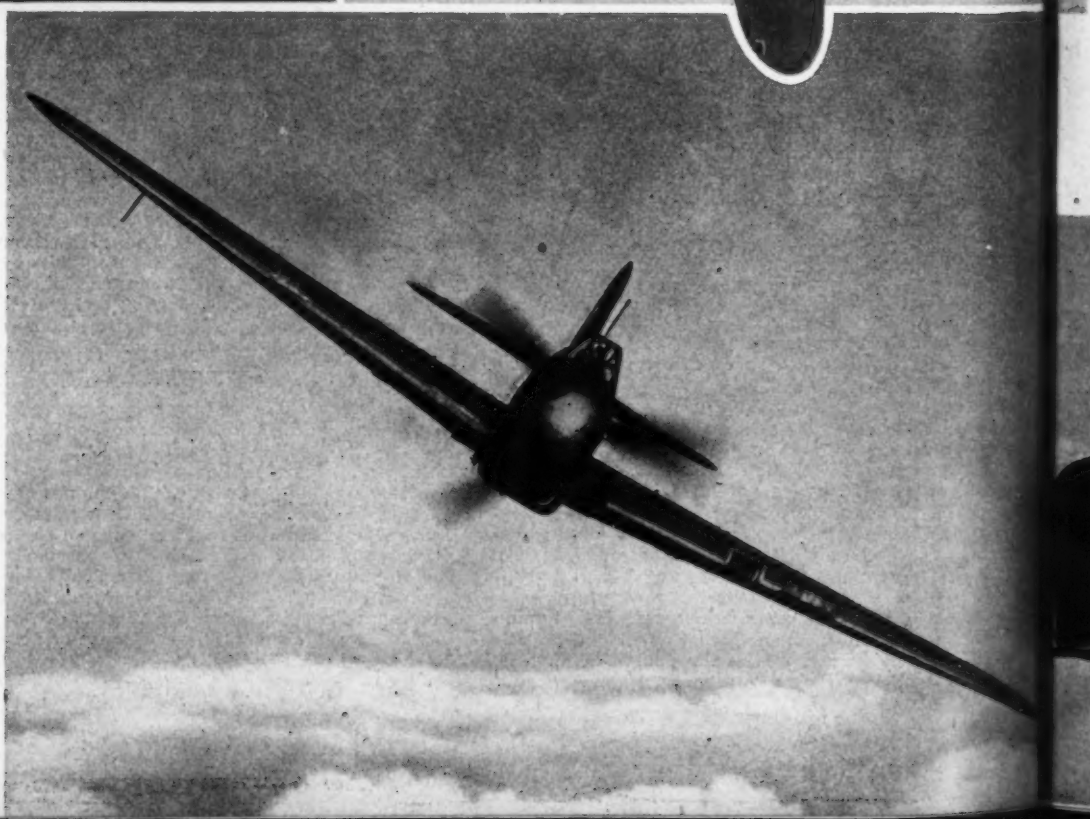
Returning to the flap business, I have often watched a rate-of-climb indicator at the moment when the flaps are raised. Despite the most violent efforts to counteract the results by pulling sharply back on the control column a rate of descent in quite large proportion has been momentarily shown. though there is a lag of quite a few seconds in the ordinary way of the instrument itself. The indication, however, is quite unmistakable and cannot be put down to a bump or other disturbance which may have upset the indicator at the same moment.

Since some machines will not quite fly, or certainly not at a safe speed, with both flaps and undercarriage down, and since boobs are not unknown, I do most seriously suggest that designers should incorporate some quite simple modification to prevent the pilot from raising the flaps beyond a certain premeditated position by one movement of the control. When baulked at a crowded aerodrome the pilot could open up, raise the undercarriage *and* raise the flaps at the very moment when he requires as little drag as possible in order even to get away with the situation, let alone be happy in it. The rest of the movement would not need to be given when making a second circuit and could, in any case, be applied at leisure when the excitement had died down.

Let no one tell me that it cannot be done or that a little nervous discomfort (or worse) does not justify a designer's efforts. Or even that production must not be held up. The modification need only apply to later machines or even to an entirely new series, so that there shall be no possibility of error. The control, too, can be altered, so that no pilot would have any excuse for thinking that he was flying a Mark II model with indicator flaps when he was only flying a Mark I with old-fashioned flaps.

INDICATOR.





FLEET AIR ARM FIGHTER

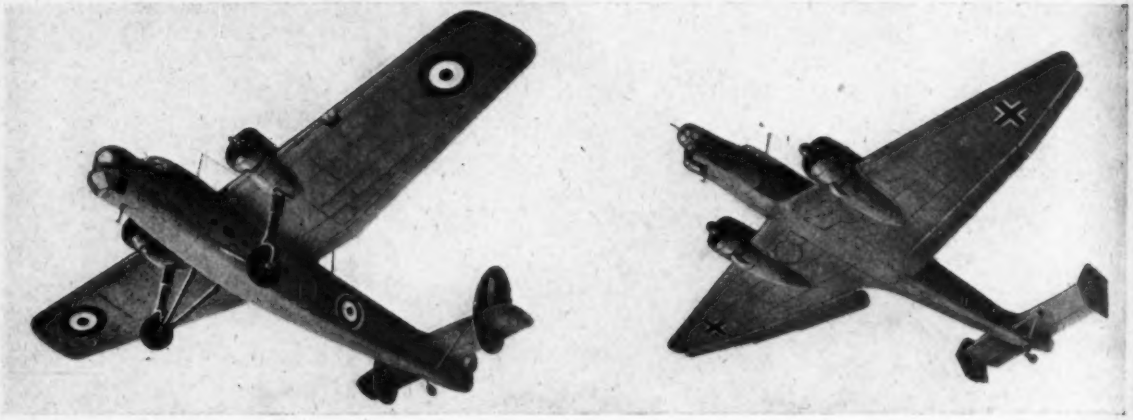
Flt. Lt. C. Staniland flies the Royal Navy's Eight-gun Fairey Fulmar for Pictures

APART from its beauty of outline, the Merlin-engined Fulmar has excellent manœuvrability and heavy punishing power. Batteries of four machine guns are carried in each wing, outside the disc of the airscrew and, therefore, able to develop their full rate of fire. Beneath the fuselage can be seen the spools for catapult take-off. The tail of the photographic machine which appears in one of the pictures belongs to a Fairey Swordfish. The two types in collaboration have done excellent work in the Mediterranean. It is likely that the work of the Swordfish in Taranto Harbour more than paid for the whole Swordfish contract.

Thirteenth of the Series

FRIEND or FOE?

Rival Bomber-transports : the Bristol Bombay and the Ju 86K



Bristol Bombay. Cantilever high-wing ; dihedral outboard of radial-engine nacelles. Gun-turrets in nose and tail and auxiliary gun-position amidships. Fixed undercarriage. Almost rectangular tailplane which bisects twin fins and rudders set well inboard. Horizontal and vertical tail surfaces strut-braced.

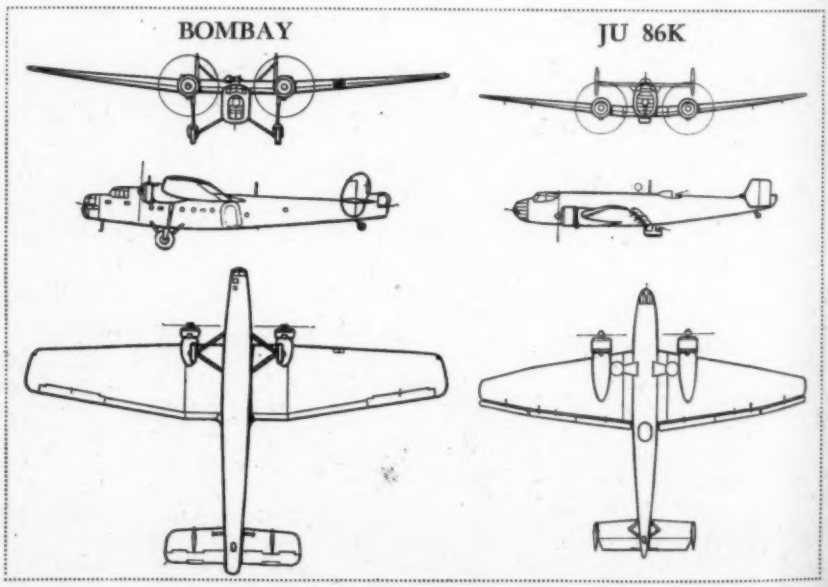
Junkers Ju 86K. Low-wing, dihedral from roots, sharp taper ; double-wing flaps in three sections. Radial or in-line engines. Gun-turret in nose, retracting "dust-bin" beneath fuselage, open gun position above. Retractable undercarriage. Rectangular, strut-braced tailplane ; outrigged twin fins and rudders.

FROM the point of operational duties there is an important difference between the Bristol Bombay and the Junkers Ju 86K. The former was designed from the start as a bomber-transport, whereas the latter was originally designed as a civil air-liner, modified for military duties as a bomber and subsequently relegated to the role of troop-carrier when the Heinkel lllK began to replace it at about the time of the Polish invasion.

For that reason the precise armament of the Ju 86K at the moment is not too certain ; the retractable "dust-bin" gun turret mentioned below the above picture may have been removed to increase man space. In any case it would not be visible when retracted as shown above.

These two troop-carriers are quite dissimilar in appearance (though they have certain constructional features in common) and the possibility of confusion does not arise. The Bombay, in fact, is one of the easiest of the big British multi-engined types to recognise. Apart from the Harrow (which is obsolescent) she is the only British aircraft of her type with fixed undercarriage and can fairly easily be distinguished from the Harrow by her much more graceful proportions. The Bombay has an appreciably greater span in relation to her length, and the underside of her fuselage makes a smooth curve from nose to tail in contrast to the Harrow's elongated angularity ; the high-wing of the latter, also, tapers very sharply to small angular tips whereas the wings of the Bombay have only a moderate taper. In any case there is no potential danger should the spotter confuse two somewhat similar British machines.

The slender oleo legs of the Bombay undercarriage are set beneath the nacelles of the twin radial engines, the undercarriage being of the divided type and braced to the bottom of the fuselage by "V" struts. There is a rotatable gun-turret in nose and tail and a row of small cabin windows (or portholes) extending along the flank beneath the wings. The tailplane, of generous span, has a slight taper on its leading-edge and a straight trailing-edge beyond which the rear turret projects. Twin fins and rudders, set well inboard from the tailplane tips, are palette-shaped and project above and below the



FRIEND OR FOE? (Continued)

tailplane. Both vertical and horizontal tail surfaces are strut-braced.

The wings of the Ju 86K, which have dihedral from the roots, have an unusual characteristic when seen in plan. The taper, which is the same on both edges, suddenly sharpens at the outer panels to very small rounded tips; double-wing flaps in three sections are fitted. Either radial or in-line engines may be used and in the latter case the nacelles are straight-sided and have "beard" radiators set immediately below the leading-edge. The oval-section fuselage projects well ahead of the airscrews and, in the more common version, has a slab-sided nose carrying a manually operated gun-turret of the "blister" type. A modification on a few later models to go into service, however, is a hemispherical nose in which a gun is mounted. The transparent top of the pilot's "office" runs straight into the line of the fuselage and there is a gunner's open cockpit just aft of amidships. The possible presence of a retracting "dustbin" gun-turret almost immediately beneath this cockpit has already been mentioned. The rectangular tailplane is mounted on the upperside of the fuselage and is externally braced by inverted "V" struts. Outrigged twin fins and rudders have no external bracing and their leading-edges slope back above and below the level of the tailplane; top, bottom and trailing-edges are all straight.

Types previously compared:—(1) Hurricane and Me 109; (2) Spitfire and He 113; (3) Beaufort and Ju 88; (4) Lysander and Hs 126; (5) Hudson and Me 110; (6) Anson and Fw 187; (7) Hereford and Do 215; (8) Blenheim IV and He 111K; (9) Skua and Ju 87B; (10) Swordfish and Ar 95; (11) Sunderland and Do 26; (12) Gladiator and Cr 42.

Next week:—Brewster Buffalo and Fiat G.50.

THE BATTLE OF BRITAIN

*Official History : A Stirring Brochure**

ALL the world knows, and has been thrilled by the knowledge, how in the three months of August, September, and October, 1940, the *Luftwaffe* set out to beat Britain to her knees and prepare the way for a German invasion of these islands, and how the Fighter Command of the Royal Air Force met that attempt, beat it back, and broke it in pieces. The story was partially told by the daily communiqués issued by the Air Ministry while the struggle went on, but these did not venture to tell much more than the daily record of losses on both sides, with frequent stories of individual fights by pilots of Spitfires and Hurricanes. All the world marvelled at the heroism of the British pilots and at the astounding successes which they achieved. Newspaper readers were told how the eight guns of the British fighters, combined with the splendid training which the pilots had been given, shot the German machines out of the skies in amazing numbers, but that was about all that could be made public at the time.

The Ministry of Information has now published a brochure at an extremely moderate price which tells the main story again, collects the facts and gives some hints of the tactics employed on both sides during those momentous months. The writer divides the battle into four phases, namely, August 8 to 18, during which the enemy mainly attacked British shipping and ports and coast aerodromes, making free use of his dive-bombers; phase two, August 19 to September 5, during which he attacked inland fighter aerodromes and aircraft factories, with intermittent attacks on some of his former targets; phase three, September 6 to October 5, which was chiefly daylight attacks on London; and phase four, October 6 to 31, in which the long-range bombers were mostly withdrawn and the fighter-bombers played the chief part.

The battle tactics of the enemy could, of course, be observed and are described—by tactics meaning such facts as the proportion of fighter escorts used with varying sizes of bomber formations. His major tactics or object in each phase could be deduced to some extent from his behaviour. But the writer is puzzled by certain facts, and no doubt the authorities of the Air Staff cannot be clear on all such points until the war is over and the operation orders of the *Luftwaffe* are published, or at least made available for perusal by students of air warfare. The author of this brochure is perforce driven to speculate. At the end of the first phase there was an interval of five days, and the author comments: "During this lull Göring evidently decided that a change of objectives was necessary. Perhaps he thought that he had achieved the necessary results and that Portland and Portsmouth together with our coastal aerodromes were virtually out of action. Perhaps he was under the impression that inland aerodromes, factories, and other industrial targets would not be so stoutly defended. It is more probable, however, that he merely gave the order for the second part of the plan to be put into operation and disregarded the failure of the first part—either deliberatively or because he had no alternative."

But if the author has to speculate on the objects of the enemy's major tactics he is even less free when he comes to mention the tactics by which the Fighter Command met the varying forms of onslaught. These, for obvious reasons, cannot be disclosed until after the war is over. One reads how the Fighter Command constantly changed its tactics, how the chief brunt was born by No. 11 Group, which was reinforced when necessary from Nos. 10 and 12 Groups. But what will be of absorbing interest to study when the time comes is the details of how the fighter squadrons were handled by the Group staffs and the Command staff. It would be unreasonable to be irritated by this necessary reticence, and yet the silence is very tantalising. About the minor tactics, attack in echelon, the weaving fighters, and suchlike, practically nothing is said.

We commend the style in which the book is written. It is not flamboyant and owes nothing to "journalese," but it is never pedestrian or matter of fact. In fact, it is worthy of its subject.

One criticism we must make. We cannot agree with the statement on page 5 that the Do. 17 is a "mid-wing" monoplane. If anything, its wings are placed somewhat higher up the fuselage than are the "shoulder" wings of the Do. 215.

* *The Battle of Britain. Issued by the Ministry of Information. 3d. net.*

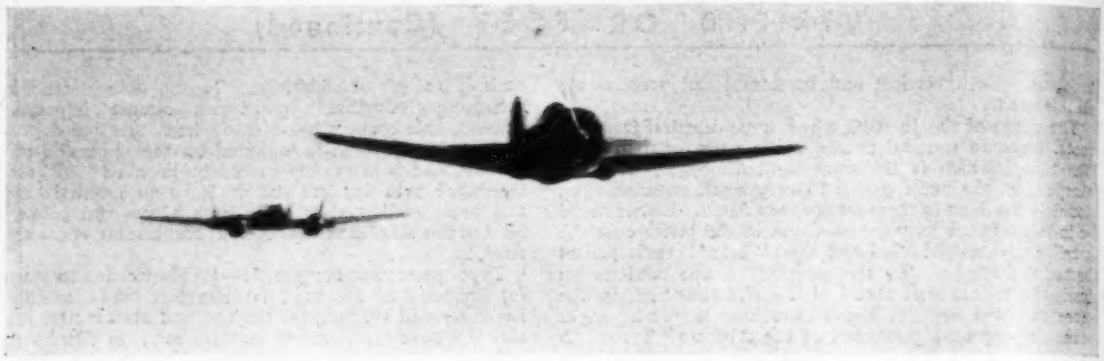
Cargo by Air

AN increasing number of references to the subject of freight by air in the aviation journals of U.S.A. in the last year show that this is a very live subject. One of the references points out that the armament manufacturing programme will require the transport of enormous quantities of material, considerable proportions of which will be wanted urgently at numerous factories in states as widely separated as Washington, California, Texas and New York. Air freighting has played a prominent part in the development of some of the less-densely populated parts of the world, such as New Guinea, Central America and Canada, and it still is. But it looks as though it is about to take its place as part of the transport system of the United States. Latest evidence of this is shown in the application of the American Air Freight Corporation, which seeks the right to run continent-wide freight lines. Freight by air has its place, but it will never displace the other means of transport except for light, valuable and urgently required goods. Those which are heavy, bulky or which cannot afford to be loaded with any but the minimum transport costs will always go by road, rail or water.

Canadian Aircraft Output

MR. RALPH BELL, the Canadian director of aircraft production, has announced that Canada is now manufacturing aircraft at the rate of more than 160 per month. After admitting there were shortages of machine tools, skilled labour, engine parts and materials, he added: "I really believe we are beginning to roll. We have bottle-necks, to be sure, but we are getting out of the wood."

It is good news that the rate of production has reached this substantial figure, and it will no doubt go higher, particularly if Mr. Bell is successful in preventing the bottle-necks puncturing the tyres of what is rolling out of the wood.



BATTLE BEGINS: The Me gets on the Mohawk's tail before starting the inevitable circling match. If the performance of the two machines is equal, it is the one that flies straight to break off the fight which is in danger.

CURTISS AND MESSERSCHMITT DO BATTLE

Mohawk and Me 110 Stage a Sham Fight

AN Me 110, reclaimed from the scrap-heaps of last year's Battle of Britain, has been brought into flying trim and is being tested both as an aeroplane and also as an air weapon. The latter tests take the form of mock air fights against standard R.A.F. types. We are able to show some photographs taken during a recent try-out against a Curtiss Mohawk. The fight had the expected—but nevertheless interesting—results.

The Me 110, it will be remembered, is one of the German "destroyer" types of fighter. It is powered by two 1,150 h.p. Daimler-Benz engines and armed with four rifle-calibre machine-guns and two 20 mm. shell-guns. In addition, the rear-gunner has one free machine-gun. On the other hand, the Curtiss Mohawk is a single-seat machine, powered by one Pratt and Whitney radial engine of 1,100 h.p. The armament as employed by the R.A.F. is not to be disclosed, but the French models of this machine had two 0.5in. machine-guns in the fuselage and a further two 0.3in. machine-guns in each wing. Obviously, there is a distinct discrepancy between maximum speeds. The Messerschmitt is good for about 360 m.p.h. at its rated altitude of 16,500ft.; the Curtiss some 35 m.p.h. slower.

This difference in speed would appear serious if the Mohawks were expected always to do battle with Me 110s as their adversaries, but against Ju 87s, Heinkel 111s, and such-like, the advantage is with the Anglo-American. In the mock fight which took place it was found that if the German would stay and fight—and, of course, presuming the altitude of both machines to be the same at the start—the Curtiss could very easily keep within the turning circle of the Messerschmitt. This

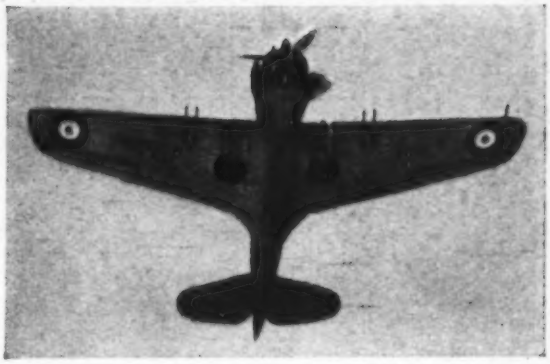
AMERICA PREPARES: (Above) Running up the Twin Wasp engine of the Curtiss Mohawk.

FRIEND AND FOE. (Left) A Messerschmitt Me 110 captured by the Royal Air Force and now on test under British markings.

CURTISS AND MESSERSCHMITT DO BATTLE (Continued)

meant that he was able to get in many more bursts of gun-fire than his opponent. The advantages of extra speed and rate of climb possessed by the twin-engined machine, however, weigh heavily in an encounter. The machine, which has an excess of speed over the enemy, is able to break off or recommence battle at will and, other things being equal, this advantage should always be decisive. That this is not always so is due to the difference in skill, training and bravery of the individual pilots.

It is interesting to learn that despite the repainting in R.A.F. colours of the captured German machines now undergoing tests, it has been found necessary to provide escorts of Hurricanes and Spitfires to save them from the various devices of the Fighter Command.



UNITED STATES PLAN: From this picture it is clear that the Mohawk used for the mock fight still had the French armament. The flush-fitting bomb racks under each wing can also be seen.

U.S. PILOTS IN THE R.C.A.F.

They Pay Their Own Fares to Canada, Too!

BETWEEN 1,100 and 1,200 United States citizens have joined the Royal Canadian Air Force since the beginning of the war, it is officially estimated. More than 700 are training for air crews and over 400 more are members of the various staffs of the British Empire Air Training Scheme. The latter are all experienced fliers with a minimum of 250 hours' flying time to their credit. Canada to-day has a minimum of 10,500 members of air crews training in this country, according to latest official figures, which are a week or two behind actual figures. The percentage of Americans training under the scheme runs as high as seven, it is believed, in addition to the members of the instructional and administrative staffs. Experienced pilots with a background of training derived from service in the U.S. Army Air Corps, Naval Air Service or Marine Flying Corps, are usually chosen as instructors for the service flying training schools of the scheme.

Pilots with long periods of service with commercial firms are also serving as pilots at bombing and gunnery schools. As pilots of the training aircraft they rank in the same category as ferry pilots who are engaged in the transportation of aircraft from factory to flying station. Texas and California, in that order, have given by far the largest number of their citizens to the Royal Canadian Air Force of the States of the Union. But among the other States Georgia and the Carolinas rank high.

Oath of Allegiance

All applicants for entry to the R.C.A.F. are ordinarily required to take an oath of allegiance to King George VI. In the case of citizens of foreign countries, however, the oath is not required of the applicant if the laws of his country would result in his forfeiting his citizenship by taking it. The only pledge that the successful candidate must make in his application, if he is a citizen of the United States, is to the effect that the information set forth in the prescribed form is correct "to the best of my knowledge and belief." U.S. citizens must make the journey from their own homes to R.C.A.F. recruiting centres in Canada at their own expense and, if accepted, they must make whatever arrangements they can as to where they will stay until officially notified of their appointment and the date on which to report. Should they return to their own homes in the interval, they must pay their own way back to the Canadian border when they receive their call for service. From the border to the manning depot the expense of transportation is borne by the Dominion Government.

Recruits from the U.S. are not segregated from their Canadian colleagues, but occupy the same type of quarters and get the same rations and messing accommodation. In the service all men, whether trained or undergoing instruction, get the same rates of pay for equivalent rank whether they are Canadians or Americans. U.S. pilots serving at the service flying training schools as flying instructors, or as staff pilots at air navigation or other schools, all hold commissions in the R.C.A.F. Those serving as flying instructors at elementary flying training schools do not hold commissions but are enlisted as aircraftmen class 2, promoted to the rank of sergeant-pilot and then released on leave without pay as civilian pilots in the employ of the civilian companies operating the schools, by whom they are paid prevailing civilian rates of pay, averaging about $300 per month. These pilots have first to attend a course of instruction at the central flying school at the R.C.A.F. Station at Trenton, Ontario, to become qualified flying instructors.

There are also many United States pilots engaged in flying aircraft at air observer schools, which are also civilian-operated. In this case the pilots are purely civilian and make their own arrangements for employment with the company operating the school under contract to the Government. Besides all these men there are also many U.S. pilots serving in the Royal Air Force, and in the transatlantic ferry service, this latter coming under the control of the Ministry of Aircraft Production.

Tribute to M.A.P.

"ABOVE us all, for we are, of course, a controlled firm, hovers the Ministry of Aircraft Production, which holds our hand and sees to it, not without an occasional touch of asperity, that there is no backsliding." Thus Sir Harold Snagge, chairman of D. Napier and Son, Ltd., in his speech to shareholders last week. Continuing, Sir Harold added: "Never was a Ministry by its very nature more obviously a target for temperamental criticism by those whom it controls, but I venture to think that our real indebtedness, on balance, to the Minister himself in his appallingly difficult job, and to his lieutenants, is now generally conceded. The aircraft industry has been a very 'close borough' and a law unto itself; but it has been compelled to accept the new jurisdiction and has done so, on the whole, with good grace. Its attitude to Lord Beaverbrook himself may, perhaps, be summed up in four short lines which recently occurred to me:

> 'He's often had us guessing;
> And we've wondered where we stood.
> But he *has* applied the ginger,
> And it's done a *world* of good.'"

After referring to Lord Beaverbrook's glowing tribute to the Sabre engine, Sir Harold said: "Our warmest congratulations are due to Major Halford, our technical director, and his staff on designing and bringing to the stage of production the Sabre engine, which we hope, and have reason to believe, will make aircraft as well as Napier history." Sir Harold also welcomed to the board of directors Mr. W. P. Savage, "who has been an active member of our executive here for some years past. He has had, both on the engine and aircraft side, much experience of men and machines in the industry and is, therefore, well qualified to make a most valuable contribution to our councils."

Correspondence

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

THE OBSERVER CORPS

Not the Only Form of Service

"DEPUTY Head Observer" does not appear to have answered your earlier correspondent's criticism that the guarantee system may tend to crowd out men who want neither pay nor guarantee.

And is he not somewhat hasty in his assumption that everyone not in the Observer Corps has necessarily been wasting his time during the past 18 months? F. L. STEVENSON.

CARBURETTOR OR INJECTION?

French Experts' Views

I HAVE studied with considerable interest the various opinions on the desirability of the direct petrol injection pump as compared to the carburettor. The main objection advanced against petrol injection pumps seems to be the difficulties of manufacture of the many parts calling for precision work. No doubt it was the early experience the Germans had with pumps for Diesel engines which induced them to proceed with experiments with pumps of similar type for petrol engines. I have just been reading the comments of M. Massuger of the Hispano-Suiza Company which appears in *Aircraft Production* for April and observe that this eminent engineer sums up in favour of petrol injection. To quote from that article M. Massuger observes:

"If in course of time the use of direct petrol-injection systems becomes general, scavenging will be greatly simplified and the problems will be more easily solved.

"Carburettors, with their many essential appendages and sometimes complicated manifolds, are very intricate components and cannot be called very efficient. Distribution, composition of mixture, aerobatic requirements, and icing-up are some of the problems by no means solved. Difficulties in connection with direct petrol injection do not now seem so great. The advantages of even distribution, reduced consumption, optimum composition of mixture under all working conditions; correct operation in all flying attitudes; use of rather lower grade fuel and elimination of fire risks due to back-firing will be well known.

"However, production difficulties centring around the precision manufacture and lubrication of measuring pumps and injection controls must remain a drawback. A simple and rather less efficient alternative which is sometimes overlooked is the placing of the injector nozzle in the manifold immediately before the induction port. The injection pressure required is then comparatively low and the feed simple. Control of injection can be electrical, hydraulic or mechanical."

It will be noticed that M. Massuger refers to electrical control of injection and in this connection there is an Italian design of electrically operated pump tested in actual practice before the war, by name the Caproni-Fuscaldo.

Ex. R.F.C.

Cutting Out During Aerobatics Can be Prevented

AS an engineer who has been in the carburettor business since 1914 and who has visited nearly every automobile factory in Europe with the exception of Russia, and during the last nine years has devoted his time to aircraft engine carburation, I would like to say how I personally confirm the views given in the article "The Case for the Carburettor."

It is my firm conviction that in no country in the world has the science of induction system design and carburation reached the high standard that it has in this country. I am certain that it is the failure to solve these problems in other countries, particularly Germany, which has led them to spend so much time on the development of fuel injection systems. I have frequently discussed the pros and cons of carburettors versus fuel injection with German engineers, and they have more or less admitted that my contention was true. There is one point which, in the numerous discussions in the aeronautical press, I have not yet seen mentioned, and which was given me by a German carburettor engineer. That is the appalling vibration which takes place when one cylinder of an injection engine cuts out due to stoppage of the discharge nozzle. I was assured that, in spite of the utmost care and the use of filters, discharge nozzles quite frequently became choked (due sometimes to scale on the inside of pipes), and that in those circumstances it was necessary to shut the engine down. In the carburetted engine, with the duplication of ignition, valve springs and sparking plugs, this to-day is an extremely rare occurrence.

When visiting Wright Field, Dayton, America, I was again afforded the opportunity of discussing the same question and do not hesitate to state that, due to the design of a carburettor which must remain unnamed, vicious freezing again centred attention on fuel injection. Freezing is quite unnecessary and can be prevented.

With regard to cutting out during aerobatics, a statement that it is possible to design carburettors free from this trouble is quite superfluous as carburettors are now in use in this country which are entirely free from this trouble under every form of aerobatics.

E. W. KNOTT.

French Research With High-pressure Injection

I AM a Frenchman and am writing you about the article on the Rolls-Royce engine's carburettor and the Junkers Jumo injection pump.

I have read with great interest in *Flight* the comparison of these engines, and was not surprised by the very exact conclusion which I explain in the following way.

First there is a principle involved which has not been mentioned. The moment when the petrol is injected into the cylinder, as in the case of the German engine, is during the induction stroke, and here lies the chief fault of the system. To get good results the petrol must be injected towards the end of the compression stroke and just before ignition. But that demands a high-pressure injection pump, and I think that, as the German engineers were not able to produce such a pump, they took a middle course and injected at low pressure (not more than 5 kg./sq. m. if my memory is good), and so destroyed all the advantages of the principle.

I assure you that one solution has been found in France, using another system for getting the high pressure. This has been tried on a big single-cylinder engine of new design, and the results were better than those obtained with a carburettor, both methods being tried from idling revs to full power. The pressure of the injector was 50 kg./sq. m.

I think that unless high-pressure injection is used it is not possible to improve on the carburettor, and so we must look at the American carburettors. I think the member of Rolls-Royce technical staff will agree with me concerning the actual system of injection.

I followed the bench tests of the French system which took place just before the Germans came into Paris, and I try to hope that this big engine, which is covered by licence, has not fallen into German hands.

A FREE FRENCHMAN.

Empire Training Scheme Cost

THE original estimate of cost of the Empire Air Training Scheme was $600 million (Canadian) for the first three years for the three Dominions concerned, but it is estimated that this item will now reach a total of nearly $1,000 million. The Canadian dollar is not the same as the American dollar, and its exchange rate is approximately 4½ to £1, so these sums are equal to £134 million and £222 million. The cost for the United Kingdom has not been definitely stated, as her part was chiefly to contribute training aircraft, an obligation which has been performed to some extent but not as much as was contemplated before the collapse of France. The Canadian share, which was originally set at $350 million (£78,000,000), has now become $853 million (£190,000,000), more than double.

The original scheme included 33 schools but the revised scheme calls for 83, of which 50 are reported to be now established. It is stated that the last school should be in operation by about July 1. Of the 50 schools established, 16 are elementary flying schools, 9 service flying, 5 observer, 3 bombing and gunnery, 2 initial training, 2 wireless, one air navigation, and one central flying school. There are also 11 other establishments for training in various aspects of the work.

Air Strategy—XLVII

POWER IN PROPAGANDA

Why Not a Speaking Robot Parachute Corps?

By CAPTAIN NORMAN MACMILLAN, M.C., A.F.C.

IF Hitler really is a mystic it is scarcely to be wondered at, for the world is to-day witnessing his revival of an ancient race struggle which is once more being fought out over the same ground. The leadership of the Free French forces by a general whose name is de Gaulle is in itself strangely significant of the *ancien régime*. The *clichés* of war and pre-war propaganda put about by the Nazis and Fascists contain the thought germs of this old race struggle which occurred during the slow evolution of man after the last of the floods, which succeeded the most recent of the northern hemisphere ice ages, subsided. That is why these *clichés* seem crude to us, yet appear fundamental to the average German who still lives in the same area as his remote ancestors.

If propaganda from this country is to succeed in Germany it must take into account this line of cleavage in the outlook of the two peoples, and I would say that the descendant of the Celt would be far more likely than the Anglo-Saxon or the Norman-sired Englishman to put over effective and, what is more important, *understood* propaganda to the German mind. For the Celts and the Germans are natural enemies, which the Germans and the Anglo-Saxons are not, while there are probably few Anglo-Normans who are not Saxonised by now.

Haw-Haw is a Failure

What is even more to the point is that the capacity of the aeroplane to carry propaganda into the heart of the country of the enemy does not appear to be utilised to anything like its full extent. (I admit, of course, that the very best propaganda is the largest possible weight of bombs accurately dropped on the best targets.) But I am thinking of what is more usually called propaganda, which is ordinarily a verbal subterfuge to make people think along certain lines, or believe in particular theories. And this form of propaganda is not only more subtle, but more difficult of accomplishment than the weightier argument of the bomb, although in the long run it may be more effective, as witness the effect of propaganda (German inspired) in Russia in 1917.

How can the aeroplane be employed to further the use of propaganda?

The modern idea of propaganda is to use the power of broadcasting. That can work well where there is freedom for the owner of a receiver to listen where he listeth. But the trouble with this form of propaganda is that so many listeners are not free to listen and, in any case, it is always difficult to compute the number of owners of receivers who tune in to listen even when they are free to do so. I am certain that Haw-Haw commands a much smaller audience in this country than was once the case, for the simple reason that his quaintly pompous delivery has palled like an overdose of sickly sweets, and the mystery of his identity has been exploded. Joyce, like a Roman candle which fizzes with a lot of little sparks, has fizzled out without having harmed anyone. He is a perfect example of the fallacious idea that it is good propaganda to get a Roman to decry Rome. He's a wash-out! The same must apply to ex-Germans decrying present-day Germany, but it does not apply to Poles, Norwegians, Danes, Dutch, Belgians and French decrying German overlordship of their countries. And the Briton, as propagandist against Germany, is as powerful as anyone for, after all, are we not still the greatest race on earth in spite of 19 months of trying to catch up with the results of our own good nature during years of letting Germany get away with things?

Now, as the people of the clouted continent are not allowed freedom to listen to the B.B.C. giving its foreign broadcasts in (I think it is 34 languages, including English) their interest, surely it is time to take the broadcasts to the people in such a way as will make it impossible for the Germans to prevent their hearing what we have to say.

Aeroplanes should carry the broadcast right into the heart of the enemy-occupied countries and into the heart of Germany itself. This is a weapon which cannot be turned against us by Germany, for Germany has no case against us as we have against her, and as the hounded hordes of Europe have against the Germans.

Brevity Essential

Obviously it will be impossible to propagate great length of speech. Diatribe will have to be cut out. Brevity will be not only the soul of wit but the mother of invention.

Remember those competitions of past years when considerable sums were paid for limerick lines? Prizes were offered for successful slogans, for a single line may often achieve more than a page of foolscap.

Each line, or few brief words, will have to be invented specially for each country; sometimes for each locality. And this is where our Allies who are fighting with us can help. They know the risibility of their countrymen. They know what is likely to make them laugh, or jubilate, or steel their hearts until the day dawns when they will again be free from the tramp of the invader's jackboot.

There is only one way to carry propaganda of this nature widespread throughout the lands occupied by our enemies, the Germans. It is by the aeroplane. How is it to be disseminated? There are many ways in which it might be done. Primarily, there must be an amplifier. The phrase spoken must be short enough to be intelligible to a person standing still to listen as the amplifier passes over his head. One hundred and twenty words a minute is quite fast enough, and would be too fast for some of those enormous German words. Probably one would arrive at a better idea of speed of diction by naming 180 syllables a minute as correct; that means three syllables a second. In ten seconds an aeroplane will travel half a mile when it is flying at 180 miles an hour, to-day a relatively slow speed, although one to which an aeroplane might slow down in safety for brief periods over enemy territory at night. If a turn is made during the ten-seconds period through 360 degrees, a half-mile circuit could be circumscribed about a diameter of 280 yards. That is a fairly tight turn at that speed, and perhaps too tight for the purpose. By increasing the diameter to a quarter of a mile the circumference of the turn would go up to 1,380 yards, equal to about 16 seconds at 180 miles an hour. Within those 16 seconds it should be possible to get out 48 syllables, or from 20 to 24 words, and a lot can be put over in 24 carefully selected words.

Persuasive Punctuation

Obviously, there would be occasions when nothing could be heard owing to the din of anti-aircraft fire from the guns and the noise of shells bursting around the aeroplane. In such circumstances this method would be useless. But, alternatively, it ought to be possible to drop by parachute a loud speaker which would repeat several times a selected phrase or two; this apparatus could be delayed in action until it has touched the ground, if that would prove advantageous, or it could be set to begin talking at a low altitude. The enemy would certainly take whatever steps they could to stop the machine from saying its piece, so it might well be combined with an explosive charge which would add a suitable exclamation mark at the end of the recitative which (once this form of punctuation became known to the enemy) would tend to persuade the German soldiers to allow the device to have its say in peace.

Or the robot voice might be carried over the heads of

POWER IN PROPAGANDA (Continued)

the enemy and their unwilling hosts by balloon, when it could be permitted to go on talking until it blew itself up to prevent its seizure by the enemy. Such an apparatus could be dropped first in parachute form, with a cylinder of compressed gas to inflate the balloon after it had left the aeroplane and settled down to a steady rate of descent.

Dropped over garrison districts, such devices might even be used to issue false orders to enemy troops to throw them into temporary confusion. Suppose a garrison got a peremptory order to fall in, bellowed in a loud voice from somewhere outside the billets or barracks, would the soldiers disobey and remain where they were? And if they obeyed and fell in, what a target they would present to the bomber above!

Prior to a bomb raid on a given objective, parachute and balloon loud-speakers could be released from a great height and by nice timing could begin their delayed-action voices in the night just in time to create confusion in the place where they were dropped immediately before the bombs began to fall. It should even be possible to make composite strips of well-known voices which have been recorded through broadcasting by picking out words or phrases and reassembling them; why should not words from Adolf Hitler's own speeches be taken and stuck together as a composite picture is assembled, but with their meaning so distorted as to create a sensation among those to whom his British fabricated speech was broadcast?

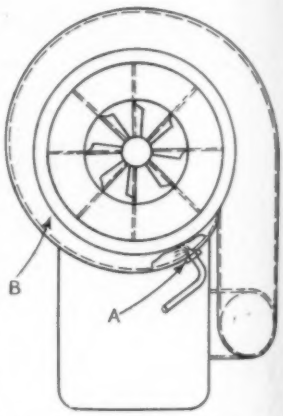
They would recognise his voice (who would not recognise that hoarse, impassioned dialect?) and might well be startled by what he was made to say. It is not so fantastic. It is merely making use of modern mechanisms of reproducing voices, but for our own ends. It might close Hitler's mouth for ever, for he might fear that anything he said would be used to turn "Fuhrer's evidence."

There are many possibilities in broadcasting in the open by means of aircraft flying over enemy territory and enemy-occupied territory. And in the event of a German attempt to invade this land of Britain, the enemy might be controlled by R.A.F. loud-speakers and diverted from their objectives as efficaciously as by bombs, or brought into an area where a special welcome was arranged for them. We have to-day means for resisting invasion which the aboriginal inhabitants of Britain never possessed. But beyond these normal means of resisting by force of arms, there is the power of the spoken word, which is not being used as it might be used by us to carry the war of the intellect, interpreted by the voice, into the heart of the camps of the enemy and into the places where the overrun peoples live, so that the first may be disorganised (at least temporarily) and the second heartened by what they hear from the air above their heads or from the speaking robots which land among them.

ONE ENGINE, ONE PUMP

How German Designer Proposes to Inject Petrol Into the Supercharger

THE subject of fuel injection is much to the fore just now, and consequently it is thought our readers will be interested in a scheme which has been proposed and patented by the German Argus Motoren Gesellschaft. Instead of the one pump per cylinder used by the designers of other German engines, such as the Junkers Jumo 211 D and the Daimler-Benz DB 601 E, the proposal of the Argus company is to use a single pump delivering a continuous spray into that part of the volute casing of the supercharger at which the cross-sectional area is smallest and where, consequently, the velocity of the air is at a maximum.



In the diagrammatic representation of the Argus scheme the nozzle is shown at A, delivering a spray into the volute casing B. Among the advantages claimed, compared with the more usual system of placing the nozzle in the suction pipe, are the following: The air at the narrow part of the volute casing is heated considerably, and there is, therefore, no tendency for separation of moisture to cause trouble, nor is it possible for ice to form. Owing to the high velocity of the air in the region of the nozzle, even when the engine is running well throttled, the atomisation of the fuel should be satisfactory. If the jet is placed in the suction pipe, there will be a tendency, when the engine is idling, for droplets of fuel to be thrown out by the impeller, and for the mixture to be seriously upset.

Expenditure on Aviation in Eire

THE total cost of constructional work at the Shannon Airport will be £1,019,000, according to the Eire Public Service estimates for 1941-42, which have just been issued. £300,000 has been spent on the airport up to the present time and another £150,000 is expected to be spent during the coming financial year, leaving a requirement of £569,000 to complete the work. £315,000 has been spent on constructional work at the new Dublin Airport (Collinstown) and £50,000 is required for work in 1941-42. A revised estimate puts the total cost of the constructional work at this airport at £383,000. The estimates also make a token provision for the construction of another civil airport at an unspecified site.

Other estimates concerning aviation include one for the adaptation and equipping of premises for the Meteorological Service in Dublin at a total cost of £10,255, of which £8,400 will be spent in the coming financial year; salaries, wages and allowances for the Meteorological Service will cost £20,678 (£23,233 in 1940-41), while a further sum of £11,200 (against £12,786 last year) is to be voted for equipment for this service. The salaries of airport officials are put at £1,100 (£500 last year). £40,000, against £35,000 in 1940-41, is for a subsidy in respect of air services, while Aer Rianta, Teoranta, is to receive £8,600 (against £4,000) for the management of the Dublin Airport. This is noted as a payment in respect of the loss incurred in the operation of the airport on behalf of the Minister for Industry and Commerce.

Daylight Cloud Ceiling Detector

FOR some time the "cloud lamp" method of measuring the altitude of the cloud ceiling over an aerodrome has been in use for night work. At a known distance from the observing station a powerful lamp projects a vertical beam upwards to strike the cloud base. The angular altitude of the bright spot on the cloud is then measured at the station, and this can be at once converted into a vertical height since the horizontal distance of the lamp is known. It was found possible to use this system to some extent in the daytime, but if the day was at all bright the spot could not be seen. A modification of it has now been perfected to enable its use in daytime and up to a height of 9,000 feet. The beam is broken into evenly spaced pulses of light and the reflection from the cloud base is detected by means of a photoelectric cell and an amplifier instead of the human eye. The method has been perfected by the U.S. Weather Bureau and the National Bureau of Standards.

Service Aviation

Royal Air Force and Fleet Air Arm News and Announcements

Hon. Surgeon to the King

AIR COMMODORE F. C. CAWTON, M.R.C.S., L.R.C.P., has been appointed honorary surgeon to the King in succession to Air Marshal Sir Victor Richardson, K.B.E., C.B., M.B., B.Ch., D.P.H., K.H.S., who has retired from the Royal Air Force.

F.A.A. Appointment

REAR-ADMIRAL ARTHUR L. ST. G. LYSTER, C.B., C.V.O., D.S.O., has been appointed a Lord Commissioner of the Admiralty and Chief of Naval Air Services in succession to Vice-Admiral Sir Guy C. C. Royle, K.C.B., C.M.G., to date from April 14th, 1941.

Fare's Fair

A CHELMSFORD road-car company has decided to give to the Royal Air Force Benevolent Fund one penny for each enemy aircraft destroyed. Each month a return is made of enemy aircraft losses, whether German or Italian, in all theatres of war, and a cheque for that number of pennies is sent to the secretary of the Benevolent Fund.

Awards

THE King has been graciously pleased to approve the following awards in recognition of gallantry displayed in flying operations against the enemy:—

DISTINGUISHED SERVICE ORDER.

Sqn. Ldr. J. R. GORDON-FINLAYSON, D.F.C., No. 211 Squadron.—This officer has completed over 100 operational sorties both by day and night. Throughout these operations, most of which have been carried out under exceptionally difficult conditions, he has displayed outstanding leadership and skill and, by his splendid example of courage and determination, has contributed materially to the successes achieved by his squadron.

DISTINGUISHED FLYING CROSS.

Capt. S. F. B. THERON, South African Air Force, No. 3 Squadron.—One day in March, 1941, this officer intercepted and shot down an enemy aircraft near Dagabhur. Later the same day, he took off and destroyed one of two Italian C.R.42's which attempted to attack Dagabhur aerodrome. Two days later, in an attack by our fighters on Diredawa aerodrome, Captain Theron shot down a C.R.42 and destroyed four Savoia bombers on the ground. In these engagements this officer displayed the greatest skill, determination and courage.

P/O. H. PATERSON, R.A.F.V.R., No. 214 Squadron.—One night in March, 1941, this officer was detailed to attack a German cruiser of the Hipper class at Brest. While reconnoitring at about 7,000 feet, a flare dropped by another aircraft illuminated the target, whereupon Pilot Officer Paterson decided to attack. Diving to 1,000 feet, in the face of heavy opposition from ground defences, he released several very heavy bombs.

During the flight, searchlights were machine-gunned and, whilst over the sea, an E-boat was also machine-gunned from a height of only 50 feet. Although his aircraft was severely damaged and difficult to handle Pilot Officer Paterson succeeded in returning to this country and in landing his aircraft safely.

This officer has completed 20 operational flights and has at all times displayed courage, determination and devotion to duty of a high order.

Act. Sqn. Ldr. A. HIBBERD, No. 42 Squadron.—One night in March, 1941, this officer was the pilot of one of a formation of aircraft, which carried out an operational sweep off the west coast of Norway and the Skagerrak. A convoy of destroyers and merchant vessels was sighted, and Sqn. Ldr. Hibberd skilfully manœuvring his aircraft, carried out a torpedo attack. Although the target was a difficult one, he brilliantly executed his attack, despite heavy anti-aircraft fire from the whole convoy. This officer has at all times showed outstanding ability and great keenness for operations.

Flt. Lt. J. F. FRASER, No. 112 Squadron.—This officer has led a detached flight with great success. He has destroyed at least 10 enemy aircraft, nine of which he destroyed within a period of 14 days. He has proved a skilful and courageous fighter pilot.

Flt. Lt. J. R. PERRIN, R.A.A.F. No. 3 Squadron.—In February, 1941, while leading a formation of three Hurricanes on patrol, this officer observed nine Junkers 87's dive bombing and machine gunning near Mersa El Berga. He immediately called his flight by radio telephone, but, failing to make himself understood, dived to the attack accompanied by only one of his section.

They were immediately attacked by 15 Messerschmitt 110's and, in the ensuing combat, Flt. Lt. Perrin shot down a Junkers and a Messerschmitt before a cannon shell burst in his petrol tank, covering him with petrol, setting his aircraft on fire and slightly wounding his right eye. Despite this, he continued to attack another Messerschmitt at a low level until his ammunition was expended. He then crash-landed his aircraft. Throughout the engagement this officer displayed outstanding leadership and courage in the face of greatly superior numbers of enemy forces.

Lt. A. DUNCAN, S.A.A.F. No. 1 Squadron.—One day in February, 1941, this officer was detailed to carry out an offensive reconnaissance accompanied by another aircraft. On alighting at an advanced landing ground to refuel his aircraft was damaged and rendered unserviceable. He immediately took off in the other aircraft and flew on alone for more than 100 miles to his objective, where he machine-gunned the aerodrome, set fire to a large mail plane and blew up its hangar.

A few days earlier, during an attack on an enemy aerodrome, his commanding officer's aircraft was attacked from behind by an enemy fighter. Lt. Duncan went to his aid and shot down the attacker. He has displayed the greatest keenness to engage the enemy at all times.

F/O. M. A. JOHNSON, R.A.F.V.R. No. 237 (Rhodesia) Squadron.—F/O. Johnson and Sgt. Gurl were pilot and air gunner respectively in an aircraft which, during a reconnaissance patrol one day in February, 1941, attacked three C.A.133's. As a result, one of these aircraft was forced down and crashed on landing. F/O. Johnson's aircraft was then attacked by three Italian fighters and, in the first attack, Sgt. Gurl was wounded in the hand. Despite this, he returned fire, causing one of the attackers to break away.

F/O. Johnson's aircraft was so severely damaged that, in attempting to land, his aircraft crashed and he was rendered unconscious. He was extricated from the wreckage by Sgt. Gurl, and, when he had recovered, both set off on foot to avoid possible capture. After travelling a few miles over difficult country they were met by some natives who assisted them to a friendly camp.

DISTINGUISHED FLYING MEDAL.

Sgt. J. G. P. GURL, No 237 (Rhodesia) Squadron.—For citation see F/O. Johnson, D.F.C.

Sgt. G. PATTISON, No. 211 Squadron.—This airman has been continuously employed as air gunner since the outbreak of war with Italy. Throughout the many engagements in which he has participated he has shown great efficiency and enthusiasm. On one occasion he was operating single-handed against three Italian G.50's and succeeded in shooting one of them down, and driving off the other two until his aircraft was able to take cloud cover.

CZECH-MATES: Ground staff of an all-Czech fighter-squadron refuelling one of their Hurricanes, somewhere in England. On patrol with their British comrades, the Czech pilots have given a very good account of themselves against the *Luftwaffe*.

Roll of Honour

Casualty Communique No. 63.

THE Air Ministry regrets to announce the following casualties on various dates. The next of kin have been informed.

KILLED IN ACTION (WHILE FLYING IN OPERATIONS AGAINST THE ENEMY).—Sgt. G. R. Armstrong, 996934; Flt. Lt. S. H. Bazley, 90359; Sgt. H. W. T. Clarke, 745499; Sgt. K. G. Cooper, 740693; Sgt. A. D. Cox, 754176; Sgt. F. E. Darnell, 759296; Sgt. L. Emmerson, 936208; Sgt. G. A. Forsyth, 740576; P/O. P. H. Gates, 85287; Sgt. M. Gough, 653281; Sgt. G. Hall, 902311; Sgt. R. G. Hicks, 652673; P/O. S. F. F. Johnson, 91005; Sgt. R. J. S. Jones, 553850; Act. Sqn. Ldr. C. S. Kemp, 37882, Sgt. N. L. Lane, 945263; Sgt. A. Lloyd, 759055; Sgt. H. G. Loates, 617644; P/O. A. McD. Melville, 82707; P/O. P. Moody, 82737; F/O. H. Morgan-Gray, 40556; Sgt. C. H. Newton, 812249; Sgt. L. T. Richards, 745715; Sgt. J. F. Shutt, 751644; Act. Wing Cdr. W. W. Stainthorpe, A.F.C., 26214; Sgt. P. Thomas, 967631; Act. Wing Cdr. G. T. Toland, 34033; Flt. Lt. D. E. C. Trench, 37456; Sgt. L. V. Weaving, 755301; Sgt. H. Windle, 580868.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. H. D. Dixon, 40809; Sgt. J. B. Dorrington, 900499; P/O. W. Mackley, 42415; P/O. E. E. Morton, 40635; P/O. P. H. O'C. Rainier, 41869; Sgt. W. L. Rawson, 580595.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. R. B. Askquith-Ellis, 42477; L.A/C. J. F. Atkins, 751819; A/C.1 S. J. W. Baines, 630891; P/O. R. A. A. Ball, 42585; Sgt. W. S. Barrett, 905832; F/O. C. P. Bomford, 37712; P/O. B. S. Booth, 42045; Sgt. R. A. Bowman, 580756; Sgt. K. B. Brennan, 549506; Sgt. J. Brookes, 560537; Sgt. K. R. Bryant, 755318; Sgt. C. J. Burt, 629928; P/O. J. M. Bushell, 43059; P/O. F. C. J. Butler, 76576; F/O. P. S. Butler, 35182; Sgt. W. G. Cameron, 548486; P/O. J. A. Clark, 41986; P/O. P. S. Crawford, 41558; Cpl. T. H. Cummins, 537830; Sgt. J. H. Davies, 742518; P/O. K. M. A. De Souza, 41679; F/O. H. P. Dixon, 90283; L.A/C. R. C. Dodd, 530700; Flt. Lt. S. Dodds, 37086; Sgt. R. G. Elliott, 740509; Sgt. H. D. B. Elsdon, 743044; Sgt. O. R. Evans, 967877; P/O. N. Ewart, 41858; Sgt. F. Fearnley, 580369; Sgt. W. Furby, 537429; Sgt. J. E. Garcka, 580425; P/O. M. J. Giles, 41996; Sgt. S. Grant, 539059; Sgt. W. H. Gray, 549063; L.A/C. A. H. Gumbleton, 538552; Sgt. J. Harrison, 580653; Sgt. L. J. Horton, 543161; Cpl. A. J. Hull, 358791; L.A/C. N. E. Jacobs, 526265; P/O. B. B. James, 77464; L.A/C. A. F. King, 546844; Sgt. V. R. T. Land, 905836; P/O. B. C. Lea, 77273; Sgt. A. T. Legge, 902217; P/O. P. Litchfield, 76461; A/C.1 J. Long, 621505; Sgt. I. M. McCulloch, 901582; P/O. A. I. McLaggan, 77985; P/O. K. Manger, D.F.C., 70867; Wing Cdr. H. M. Mellor, 16097; Sgt. F. S. Miller, 515573; Sgt. S. Morgan, 539583; A/C.1 T. Morton,

SERVICE AVIATION (Continued)

615295; Sgt. C. Naylor, 581407; A/C.1 E. G. Newby, 622865; Sgt. T. H. Nicholls, 561837; L.A/C. R. H. Nugent, 537353; L.A/C. G. R. J. Parsons, 547309; P/O. B. C. Paton, 42021; A/C.1 E. Pearce, 624941; P/O. J. L. Piercey, 44776; P/O. F. H. Posener, 41735; Sgt. B. Poskitt, 522475; Cpl. R. Purves, 549286; Sgt. R. H. Radford, 564970; Cpl. A. G. Richards, 551007; P/O C. H. Robinson, 70873; Sgt. J. H. Saville, 745096; Sgt. J. M. Sculfer, 552947; Sgt. G. B. Smith, 563381; Sgt. D. F. Spencer, 580627; Sgt. R. A. Steele, 751178; Sgt. S. G. H. Stephens, 566150; Sgt. A. T. Summers, 563808; F/O. A. R. B. Tedder, 70666; F/O. C. R. D. Thomas, 40031; P/O. P. N. Trolove, 36183; F/O. J. E. Vernon, 36145; Sgt. J. H. Waterfall, D.F.M., 631726; P/O. A. E. Wickham, 36200.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—Sgt. H. S. Wall, 751254; Sgt. H. C. Westley, 650218.

WOUNDED OR INJURED IN ACTION.—P/O. R. Armstrong, D.F.C., 43193; Sgt. B. D. L. Gillman, 754450; P/O. J. E. I. Grey, 86368; Sgt. K. R. W. Sims, 521127; Sgt. G. R. Smith, 900190; Sgt. M. H. Vivian, 904496; Sqn. Ldr. C. A. Wood, 37C30.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Flt. Lt. J. W. Fordham, 33247; Sgt. J. C. Stanley, 652027.

PREVIOUSLY REPORTED WOUNDED OR INJURED IN ACTION, NOW REPORTED DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Sgt. G. B. Booth, 748586; Sgt. A. McG. Grant, 742551.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. J. Bimson, 970580; Sqn. Ldr. C. E. E. Florigny, 34235; Sgt. R. V. Huston, 745954; Sgt. S. Jones, 668353; P/O. C. E. Langdon, 43705; Sgt. E. F. Matthews, 640340; Sgt. T. F. Nicholas, 517475; Sgt. C. C. Pavitt, 652166; Sgt. J. S. Rose, 566059; Sgt. R. Smith, 758058; P/O. A. G. Wainwright, 84675; Sgt. R. A. Walker, 751481; Sgt. D. S. Wallis, 754744.

MISSING.—P/O. E. A. Alexander, 88648; P/O. K. N. Arthurs, 86705; Sgt. J. L. Baxter, 629458; L.A/C. S. Blagrove, 907856; Sgt. J. Bowes, 947042; Sgt. R. Bradbury, 937480; F/O. R. C. W. Broad, 42188; P/O. D. S. Brooke, 85936; Sgt. L. C. Butcher, 581496; Sgt. S. Charlton, 910759; Sgt. R. Clark, 755818; Sgt. R. E. G. Clift, 967821; Sgt. A. Coates, 907743; Sgt. E. Dalton, 754100; P/O. M. J. David, 88683; Sgt. J. G. Earley, 970686; Sgt. I. H. Fenton, 745797; P/O. A. A. Florigny, 85016; L.A/C. P. B. Goatly, 753596; P/O. G. H. Green, 42499; F/O. I. S. Henderson, 33406; Sgt. D. A. T. Heslop, 549514; Sgt. A. C. Hoare, 745891; F/O. A. G. W. Hough, 42228; Sgt. J. N. Huddlestone, 938919; Sgt. J. H. S. Jacobs, 912736; Sgt. W. P. Jinks, 745105; Sgt. A. E. Laing, 625929; Sgt. W. Lake, 755878; Sgt. A. E. Law, 977534; F/O. H. G. L. Lawson, 40307; Sgt. E. K. Lindsay, 940172; Sgt. M. F. Lloyd, 742802; Sgt. W. McIntosh, 644566; Sgt. W. H. MacLeod, 904361; Sgt. B. M. Mansfield, 749519; Sgt. F. May, 754677; P/O. G. C. Muir, 82212; Sgt. J. N. Murray, 968178; L.A/C. R. J. Nash, 907602; P/O. R. E. Owen, 88466; Flt. Lt. A. F. Pain, 39945; Sgt. J. A. Patterson, 550572; Sgt. J. R. C. Pratt, 969698; Sgt. J. W. Quincey, 745144; Cpl. H. Read, 355975; Sgt. J. P. Redmond, 975988; L.A/C. F. A. Rivers, 960865; Sgt. E. Routledge, 942668; Sgt. R. D. Rushton, 652008; P/O. A. A. Scott, 42943; L.A/C. D. M. Sharp, 906614; Act. Sqn. Ldr. A. L. H. Solano, 37511; Sgt. J. Stewart, 945565; Act. Sgt. E. W. A. Sutton, 759078; Sgt. R. H. Thomas, 755579; Sgt. A. Turner, 966819; Sgt. J. E. Waller, 624357; Sgt. A. E. Waters, 639743; Sgt. D. G. Watt, 844595; Sgt. P. H. Woodbridge, 745564; Sgt. C. J. Woods, 652254.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE (WHILE ENGAGED ON NON-OPERATIONAL FLYING DUTIES OR ON THE GROUND THROUGH ENEMY ACTION).—L.A/C. R. D. M. Bannister, 1179749; P/O. I. E. Brennan, 88229; F/O. L. G. H. Kells, 70806.

KILLED ON ACTIVE SERVICE.—A/C.2 R. J. Atkinson, 121421; P/O. G. C. Beale-Browne, 78529; L.A/C. G. Bevan, 933042; Sgt. W. D. G. Bond, 903298; Flt. Lt. P. H. Buckley, 39371; P/O. G. R. M. Buley, 60064; Sgt. A. B. Burrow, 759248; P/O. D. F. Caird, 60331; Sgt. J. M. Chambers, 987191; Sgt. O. Cousins, 988256; Sgt. C. Couzens, 546805; A/C.1 H. Davenport, 980614; Sgt. V. C. Dennant, 900941; Sgt. L. F. De Reeck, 905830; Sgt. J. S. Dukes, 365732; Sqn. Ldr. J. E. Dutton, A.F.C., 36071; L.A/C. D. C. Ellerbeck, 928881; Sgt. E. Featherstone, 628378; Sgt. E. F. Fry, D.F.M., 741738; Sgt. J. M. Gallyon, 903639; Sgt. R. W. Gates, 631151; Sgt. L. J. F. Godwin, 590507; Act. F/O. M. I. F. Green, 86652; L.A/C. P. M. Gregory, 921081; Sgt. F. W. M. Hanson, 1181030; P/O. D. N. Harper, 60533; Sgt. J. Hayes, 986083; P/O. A. D. P. Hewison, 89776; A/C.2 F. B. Holdstock, 1223122; L.A/C. P. L. Jackson, 948099; Sgt. F. F. Jefferies, 755857; P/O. P. W. Jeffery, 86407; A/C.2 H. F. Johnson, 1165694; Sgt. W. F. McEwan, 745691; A/C.2 R. J. Mallett, 1115739; Sgt. N. R. Mansell, 938028; Flt. Lt. R. R. Manson, 33121; Sqn. Ldr. E. J. K. Megaw, 28049; A/C.2 F. W. Morgan, 1326603; Sgt. S. G. Mowforth, 999279; Sgt. E. E. C. Phillips, 911566; Sgt. G. L. Pitman, 742144; Sgt. D. A. Poyser, 972077; Cpl. H. R. Proudlove, 623219; Sgt. T. Randall, 751826; Flt. Lt. A. F. Riddlesworth, D.F.C., 39567; P/O. S. G. Rodd, 85646; Sqn. Ldr. L. W. Saben, 34178; P/O. H. Scadeng, 80903; P/O. G. C. Smillie, 60100; Sgt. W. Smith, 983138; Sgt. E. A. V. Spencer, 581537; L.A/C. A. R. Sumnton, 998732; Sgt. L. W. Taylor, 1165278; Sgt. C. A. Venn, 969799; Sgt. P. Y. Walker, 561258.

PREVIOUSLY REPORTED MISSING BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—L.A/C. E. Bell, 641894; Sgt. J. D. Bell, 522900; A/C.1 F. S. H. Chave, 508618; A/C.1 J. B. Christie, 625723; L.A/C. C. F. Cormack-Beatson, 534033; L.A/C. H. G. Edwards, 551107; Wing Cdr. J. M. Fairweather, D.F.C., 07077; A/C.1 H. Fisher, 639435; Cpl. G. T. Hall, 529271; A/C.2 H. J. Hedger, 908440; A/C.2 J. F. Hopkinson, 617338; L.A/C. R. W. Hunter, 760014; L.A/C. R. S. Jary, 524483; L.A/C. R. M. Kelly, 542978; A/C.1 J. Kerr, 639579; A/C.2 T. E. Lawson, 908388; A/C.1 J. D. Niall, 619958; A/C.1 J. H. Norris, 616532; P/O. T. J. Powell, 42643; Cpl. W. C. Rushton, 523638; L.A/C. H. V. Sargent, 629753; A/C.1 P. W. Saunders, 547248; A/C.1 H. V. Smith, 654382; A/C.2 S. Smith, 623477; L.A/C. J. V. L. Thomas, 516061; Cpl. J. Whittet, 591163.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—A/C.2 G. A. Chart, 963218; A/C.2 H. W. Dean, 975058; Sgt. C. C. Heyward, 742062; L.A/C. R. T. Jones, 544901; A/C.2 N. W. Olsen, 940188; Sgt. L. A. N. Walker, 755305; Sgt. I. Winberg, 755989.

PREVIOUSLY REPORTED MISSING BELIEVED KILLED ON ACTIVE SERVICE, NOW REPORTED KILLED ON ACTIVE SERVICE.—Sgt. R. M. Galbraith, 553780; Sgt. W. Warren, 349651.

WOUNDED OR INJURED ON ACTIVE SERVICE.—L.A/C. J. Haynes, 533281; Sgt. D. V. Jenkins, 551724; Sgt. E. Lawley, 954205; Sgt. R. H. Porritt, 591260; A/C.1 J. Smith, 947627.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Flt. Lt. R. F. Halliwell, 33341.

DIED ON ACTIVE SERVICE.—Sgt. T. D. Ainsley, 967756; A/C.1 T. Arundel, 1061655; A/C.2 R. Ashworth, 1116058; A/C.2 G. Barr, 986006; L.A/C. J. E. Bennett, 1104240; Sgt. G. L. Bland, 904299; A/C.2 H. A. G. Bledge, 1034054; L.A/C. J. Boulter, 799945; A/C.2 S. Calvert, 1308756; P/O. H. J. Clements, 84079; A/C.2 W. H. Collins, 959075; Sgt. K. G. Deacon, 906493; Flt. Sgt. S. C. Ellis, 349417; A/C.2 R. A. Evans, 1197659; Sqn. Ldr. W. B. Frederick, 10091; P/O. J. Friend, 82313; A/C.2 E. C. Heape, 1220783; A/C.1 G. E. Hicks, 98680; A/C.1 L. H. Holmes, 865135; L.A/C. G. Huches, 611663; A/C.2 H. J. Johnson, 1224381; A/C.1 J. Keatings, 544410; A/C.2 W. J. Kennett, 1264378; L.A/C. R. G. Marshall, 1162707; A/C.1 A. B. Neil, 992444; W/O. B. Newton, 335390; A/C.2 E. T. Pattle, 930733; Grp. Capt. A. Shekleton, C.B.E., D.S.O.; A/C.2 K. G. Smith, 1192756; A/C.2 W. P. Sumner, 1280696; Cpl. D. T. Teed, 536231; A/C.2 V. D. Thorp, 1270589; L.A/C. H. C. Young, 540980.

PREVIOUSLY MISSING, NOW SAFE.—L.A/C. J. H. Jarvis, 506616; P/O. K. M. Millist, 42420.

W.A.A.F.

DIED ON ACTIVE SERVICE.—A/CW.2 L. K. Warren-Smith, 896585.

Royal Australian Air Force

KILLED IN ACTION.—Wing Cdr. R. A. Holmwood.

KILLED ON ACTIVE SERVICE.—P/OO. W. J. Shirtcliffe, 2008.

DIED ON ACTIVE SERVICE.—L.A/C. J. H. Jones, 1965.

Royal New Zealand Air Force

KILLED IN ACTION.—Sgt. J. F. Wallace, NZ401735.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. R. W. Brockman, A40816.

WOUNDED OR INJURED IN ACTION.—Sgt. R. G. Mills, A40624.

MISSING.—Sgt. C. E. Donehue, NZ40915.

South African Air Force

MISSING, BELIEVED KILLED IN ACTION.—Lt. J. J. Coetzer.

London Gazette

Royal Air Force

Air Ministry, March 21.

Air Cmdre. F. C. Cowtan, M.R.C.S., L.R.C.P., is appointed an Hon. Surgeon to the King (Mar. 1), vice Air Marshal Sir V. Richardson, K.B.E., C.B., M.B., B.Ch., D.P.H., K.H.S., who relinquishes that appt. on retirement.

General Duties Branch.

Flt. Lt. (temp. Sqn. Ldr.) D. Davies is granted a permanent commn. in substve. rank of Flt. Lt. (Jan. 16).

The follg. are granted temp. commns. as P/Os. on being employed with the R.A.F.:—(Feb. 15) G. P. R. Anslo, 2nd Lt., R. Sussex R.; H. C. Carpenter, 2nd Lt., The Queen's R.; R. I. Tibbenham, 2nd Lt., W. York. R.; H. H. Henderson, 2nd Lt., E. Lan. R.; C. K. Parkes, 2nd Lt., R.A.; H. L. J. Aitchison, Lt., S. Stafford. R.; O. L. Gwynne, Lt, R.E.; H. T. Winter, 2nd Lt., Lan. Fus.; P. M. C. Hill, Lt., R.A.; H. G. J. Coldington, 2nd Lt., R.U. Rif.; R. W. Ware, Lt., R.E.; C. T. P. Stephenson, 2nd Lt., R.A.; D. W. Jackson, 2nd Lt., R.A.; P. G. Robarts, 2nd Lt., R.A.C. (T.A.); J. B. Rowlands, Lt., R.A.; F. Rothwell, Lt., Lan. Fus.; R. Scott-Worthington, Lt., Middl'x. R.; P. H. Looker, 2nd Lt., Lincoln. R.; F. N. P. Osborne, 2nd Lt., Gren. Gds.; J. R. Frenneaux, 2nd Lt., Green Howards; J. F. Saward, 2nd Lt., R.A.; J. L. Gledhill, 2nd Lt., R.A.; J. D. Davis, 2nd Lt., R.A.; (Feb. 16) E. R. P. Milne, 2nd Lt., S. Lan. R.; (Feb. 18) W. L. Chesser, Lt., R.A.; D. H. Martin, 2nd Lt., Loyal R.; (Feb. 21) L. J. Harries, 2nd Lt., N. Staff. R.

The follg. are granted commns. for duration of hostilities as P/Os. on probn.:—Temp. W.O.: (Feb. 23) W. H. Forster. Flt. Sgts.: (Jan 25) H. S. Burrows; (Feb. 25) D. W. K. Miles. Sgts.: (Jan. 7) P. R. Smith; (Feb. 20) A. J. Hodgkinson; (Feb. 22) B. F. Williamson; (Feb. 23) E. E. Allen; (Feb. 24) W. E. Drew; (Feb. 25) N. S. Petch; (Feb. 26) E. J. Sewell, D.F.M.; (Feb. 28) T. R. Meggitt.

The follg. P/Os. on probn. are confirmed in their appts. and promoted to war substve. rank of F/O.:—(Jan. 17) J. Mills, F. M. Morison, W. E. Nicholas, D.F.C., A. A. Scott, R. Trevie-Roper, H. C. P. Turney, T. S. Wilson, P. F. Dunham; (Mar. 7) R. C. L. Parkhouse.

Sqn. Ldr. D. G. Morris is promoted to rank of Wing Cdr. (temp.) (Mar. 1).

The follg. F/Os. are promoted to war substve. rank of Flt. Lt.:—(Sept. 3, 1940) J. G. Cave, R. F. T. Giddings; (Sept. 26, 1940) H. W. Tennant; (Jan. 1) T. B. Fitzgerald, D.F.C., D. H. Ward; (Jan. 5) R. E. P. Brooker; (Jan. 12) A. J. Blackwell, E. J. Morris; (Jan. 30) J. F. Cook, A. M. Murphy, C. V. D. Willis; (Feb. 1) C. W. Bromley; (Feb. 3) J. N. Harris; (Feb. 9) D. M. Taylor; (Feb. 10) J. Brandt, P. S. Davis, J. G. Minifie; (Feb. 12) E. W. Brown, D. McK. Edmondson, R. F. Finch, A. D. Gosman, K. A. Porter, W. H. Stratton, D.F.C.; (Feb. 18) K. R. Ball, P. Walker; (Feb. 20) H. J. Holt; (Feb. 23) J. A. H. Cooper, I. W. Hutcheson, H. J. N. Lindsaye, D. Shawe, J. C. Simpson; (Feb. 24) R. McClelland, J. R. Neill; (Mar. 6) D. S. Winning.

The follg. F/Os. are granted war substve. rank of Flt. Lt.:—(Dec. 6, 1939) P. S. Weavet, D.F.C.; (Mar. 20, 1940) E. B. Green, M.C. (Retd.); (Apr. 22, 1940) R. G. Taylor (subst. for notifn. of Oct. 8, 1940); (May 10, 1940) H. a'B. Russell; (Aug. 24, 1940) J. A. Leathart, D.S.O.; (Aug. 25, 1940) T. J. Hanlon.

The follg. P/Os. are promoted to war substve. rank of F/O.:—(Sept. 3, 1940) R. Herrick; (Nov. 6, 1940) M. A. Bussey; (Dec. 27, 1940) N. K. Stansfield, D.F.C.; (Jan. 17) L. D. Loasby; (Feb. 1) J. J. Barr, K. C. Dryden, J. M. Malburn, J. C. Paish, E. B. Panter, J. F. Percival, E. G. Pett, M. C. G. Sherwood, H. C. Upton, J. J. Walsh; (Feb. 4) N. Davson, J. D. Mallinson; (Feb. 10) E. F. V. Copsey, J. M. Jackson, A. C. Lawson, G. J. Le Mar, D. F. Lenton; (Feb. 18) J. V. Eason, P. A. Haggarty, M. H. Hankins, D. G. Hayward, R. E. Kirkby, D.F.C., S. E. Pattinson, J. R. Rainford, C. B. Rigg, A. C. Sargent; (Feb. 24) H. A. Litvin; (Feb. 28) H. W. Eliot; (Mar. 1) R. A. G. Paramore; (Mar. 2) F. H. James, J. A. Temperley.

The follg. P/Os. are granted war substve. rank of F/O.:—(Dec. 6, 1939) H. G. Hardman (subst. for notifn. of Oct. 8, 1940); (Feb. 8, 1940) A. T. Williams, D.F.C., (substd. for notifn. of Apr. 2, 1940); (Apr. 7, 1940) G. J. Lister (substd. for notifn. of Oct. 8, 1940); (Apr. 19, 1940) W. P. Cumberland (substd. for notifn. of Oct. 8, 1940); (June 20, 1940) P. Peters (substd. for notifn. of Oct. 8, 1940); (July 12, 1940) P. A. Ostle (substd. for notifn. Oct. 8, 1940); (Aug. 23, 1940) K. MacI. Miller (substd. for notifn. of Nov. 5, 1940); (Aug. 29, 1940) P. B. Gordon; (Nov. 30, 1940) N. L. Letten.

The follg. Air Cmdres. are granted acting rank of Air Vice-Marshal:—(Feb. 14) F. H. M. Maynard, A.F.C.; (Feb. 21) R. L. G. Marix, C.B., D.S.O.

Marshal of the Royal Air Force Sir Cyril L. N. Newall, G.C.B., O.M., G.C.M.G., C.B.E., A.M., is placed on half pay (Jan. 25).

The follg. are transfd. to Technical Branch:—(Apr. 24, 1940) Wing Cdr. J. T. Mynors, Sqn. Ldr. G. N. E. Tindall-Carill-Worsley; (Feb. 10) P/O. on probn. D. Hope.

The follg. P/Os. relinquish their temp. commns. on return to Army duty (Feb. 18):—P. M. Hackette, 2nd Lt., Manch. R.; A. S. Robertson, 2nd Lt., R.A. (T.A.).

F/O. K. H. V. Day resigns his short service commn. (Nov. 21, 1940).

The short service commn. of P/O. on probn. W. McC. Osborne is terminated on cessation of duty (Oct. 21, 1940).

Technical Branch.

The follg. are granted commns. for duration of hostilities as F/O. on probn.:—W.O.: (Feb. 20) A. F. T. Jones. As P/Os. on probn.:—W.O.: (Feb. 22) L. A. Andrews. Flt. Sgt.: (Dec. 6, 1940) J. Goodman. As Act. P/Os. on probn.:—Flt. Sgts.: (Feb. 14, sen. Oct. 14, 1940) W. E. Bloomfield; (Feb. 14, sen. Oct. 7, 1940) J. J. Dennis; (Feb. 14, sen. Oct. 10, 1940) R. H. C. Simpson. Cpl.: (Feb. 21) A. V. R. N. Chart.

Sqn. Ldr. G. N. E. Tindall-Carill-Worsley is promoted to rank of Wing Cdr. (temp.) (Sept. 1, 1940).

The follg. F/Os. are granted war substve. rank of Flt. Lt.:—(Mar. 6, 1940) E. H. McDonald; (Jan. 1) H. Vatcher.

P/O. on probn. M. P. Croft is promoted to war substve. rank of F/O. on probn. (Feb. 14).

Balloon Branch.

The follg. P/Os. on probn. are promoted to war substve. rank of F/O. on probn.:—(Nov. 27, 1940) F. W. R. Wood, W. McQ. Pratt.

Administrative and Special Duties Branch.

W/O. J. H. Barlow is granted a commn. for duration of hostilities as F/O. on probn. (Feb. 20).

F/O. H. M. Baker is granted war substve. rank of Flt. Lt. (Oct. 19, 1940).

The follg. P/Os. on probn. are promoted to war substve. rank of F/O. on probn. (Feb. 1):—R. C. Davey, T. G. Morris, H. Filkins.

P/O. C. E. Mitchell is transfd. to Technical Branch (Sept. 9, 1940).

Equipment Branch.

The follg. are granted commns. for duration of hostilities as P/Os. on probn.:—W/Os.: (Feb. 14) J. W. Henley; (Feb. 27) A. W. I. Mosdell.

SERVICE AVIATION (Continued)

P/O. D. MacD. Jannaway is confirmed in his appt. (Jan. 23, 1940) and granted war substve. rank of F/O. (May 5, 1940) substd. for notifn. of Oct. 22, 1940).

P/O. I. H. Matheson is confirmed in his appt. (Aug. 17, 1940) and granted war substve. rank of F/O. (June 11, 1940) substd. for notifn. of Oct. 29, 1940).

The follg. P/Os. are granted war substve. rank of F/O.:—(Dec. 3, 1939) R. M. W. Henderson (substd. for notifn. of Oct. 8, 1940); (Mar. 11, 1940) J. M. Howard (substd. for notifn. of Apr. 9, 1940); (Apr. 1, 1940) T. F. H. Hudson (substd. for notifn. of Oct. 8, 1940); (June 11, 1940) H. E. Barker (substd. for notifn. of Oct. 8, 1940). H. E. Campbell-Orde (substd. for notifn. of Oct. 8, 1940).

Accountant Branch.

The follg. Act. P/Os. on probn. are graded as P/Os. on probn.:—(Sept. 4, 1940) V. W. A. Matthews, C. V. Walters.

Medical Branch.

Air Vice-Marshal H. E. Whittingham, C.B.E., M.B., Ch.B., F.R.C.P. (E), F.R.F.P.S. (G), F.R.C.P. (Lon.), D.P.H., D.T.M. & H., K.H.P., is promoted to rank of Air Marshal (temp.) (Mar. 1).

Royal Air Force Reserve

RESERVE OF AIR FORCE OFFICERS.

General Duties Branch.

The follg. F/Os. are promoted to war substve. rank of Flt. Lt.:—(Sept. 3, 1939) H. D. Morley, W. G. Stevenson; (Jan. 6) J. A. Newton; (Feb. 20) R. P. Wallis.

F/O. C. F. French is granted war substve. rank of Flt. Lt. (Apr. 1, 1940).

Sqn. Ldr. D. Hodson (Maj., S.U.L., I.A.) relinquishes his commn. in class CC on appt. to a commn. in the R.A.F.V.R. (Feb. 24).

Administrative and Special Duties Branch.

Flt. Lt. J. H. C. Harrold is transfd. to Technical Branch (June 1, 1940).

Royal Air Force Volunteer Reserve

General Duties Branch

The follg. are granted commns. for duration of hostilities as P/Os. on probn.:—Sgts.: (Jan. 15) F. Baldwin, W. M. L. Bispham, E. P. W. Bocock, E. P. S. Brown, L. S. Clayton, J. A. R. Falconer, J. S. Harris, R. H. Jagger, W. A. Laurie, W. H. Lowe, C. G. Marshall, B. K. Nelson, E. G. O'Kelly, L. V. Sanders, P. E. Springman, G. K. A. Brownrigg, J. S. Shuchburgh; (Feb. 11) A. Schofield; (Feb. 14) R. W. Rivett; (Feb. 16) S. F. Hodsman; (Feb. 19) R. P. Worthy, M. Paterson, J. G. G. Wilkinson; (Feb. 23) J. C. White; (Feb. 24) P. C. Sawyer; (Feb. 26) P. C. Ward, J. H. Bottison. L.A/C.: (Dec. 21, 1940) J. Clapham; (Jan. 5) J. P. Croker, W. G. Henderson, J. E. Hogg, H. B. Milman, R. L. Newell, G. G. Potter, M. D. Tucker; (Jan. 20) J. H. S. Haigh, J. R. Collis, E. H. Matthews, B. Mayes, R. H. M. Munroe, T. C. Smith, W. W. Swinnerton; (Jan. 25) M. R. Attwater, K. C. Gooch; (Feb. 3) A. S. C. Lumsden; (Feb. 9) H. B. Oldfield; (Feb. 11) R. D. Cunningham, J. A. Rennie, P. R. Smith; (Feb. 12) W. E. Bowden, G. R. Haggas; (Feb. 16) P. A. Christian, R. Gee, G. G. Goodale, W. S. P. Griffiths, T. R. Jenkins, G. Kerr, F. W. R. Newcomb, G. E. C. Seale, R. F. Warton, R. L. Bartley, J. W. L. Botting, C. F. A. Brown, A. A. Cooke, R. W. Read, K. T. Cooper, A. G. Davidson, J. V. Hopgood, L. F. Livingstone, D. H. S. Lonsdale, T. A. Lumb, P. R. Owen, T. Prescott-Decie, F. K. Doyle, J. L. Rowe, E. G. Daniel; (Feb. 17) J. G. F. Booth, I. V. Cooper, B. A. Grosvenor, R. A. Hedderick, N. J. Lockyer, D. W. Shaw, J. F. Raw; (Feb. 19) B. N. Greves, W. E. Hinchliffe, H. Law, R. B. Roache, G. A. Etheridge, A. V. Wood, A. Poole, H. A. C. Read, J. G. Westcott; (Feb. 20) G. M. Lewthwaite; (Feb. 22, sen. Nov. 7, 1940) G. Williams; (Feb. 22) R. Catnach, P. S. Patterson, D. R. J. Harper; (Feb. 23) M. McCreanor, H. L. D. Tanner; (Feb. 26) A. W. Amos, J. R. Gibbon. As Act. P/O. on probn.:—(Feb. 21, sen. Nov. 18, 1940) R. C. Webster.

The follg. P/Os. on probn. are confirmed in their appts. and promoted to war substve. rank of F/O.:—(Sept. 29, 1940) D. H. Macbeath; (Nov. 8, 1940) G. C. H. Culley; (Dec. 24, 1940) F. H. Holmes; (Jan. 14) S. N. Pearce, M. J. Sainty; (Feb. 1) J. H. Ashton, W. N. Basson, R. Billings, O. J. Dempsey, J. N. Derbyshire, M. J. D. O'Leary, N. S. Parrott, D. Passmore, P. E. Penfold, V. A. Ricketts; (Feb. 5) R. J. Falk; (Feb. 10) S. A. Stevenson.

P/O. on probn. W. M. Colby is confirmed in his appt., Dec. 3, 1940, and promoted to war substve. rank of F/O. (Jan. 15).

The follg. P/Os. on probn. are confirmed in their appts. on Dec. 30, 1940, and promoted to war substve. rank of F/O. (Feb. 4):—F. R. Arnold, J. Grocott, P. H. Hazleman, G. B. Houghton, H. Quittenden.

The follg. P/Os. on probn. are confirmed in their appts. on Dec. 30, 1940, and promoted to war substve. rank of F/O (Feb. 26):—J. Lynch-Whyte, D. H. Murphy.

F/O. W. H. M. Walker is promoted to war substve. rank of Flt. Lt. (Sept. 3, 1940). Substd. for notifn. of Oct. 29, 1940.)

THEY KNOW THEIR ONIONS. A fighter-squadron now operating in England is maintained by funds raised by the people of Natal and is known as the Natal Fighter-Squadron, many of its personnel being themselves South Africans. In their spare time the pilots cultivate a vegetable garden, as shown here, and are said to have sown onions behind barbed wire!

F/O. J. W. R. Kempe is promoted to war substve. rank of Flt. Lt. (Jan. 1).

The follg. P/Os. are promoted to war substve. rank of F/O.:—(May 11, 1940) J. M. F. Dewar; (May 31, 1940) I. C. Strutt; (Sept. 25, 1940) W. J. B. Wadie; (Jan. 8) H. Oxlin.

Act. P/O. on probn. H. L. King is transfd. to Administrative and Special Duties Branch (Mar. 10).

The commn. of P/O. on probn R. J. Arten is terminated on cessation of duty (Mar. 11).

Technical Branch.

The follg. are granted commns. for duration of hostilities as P/O. on probn.:—Flt. Sgt.: (Feb. 3) W. P. Gibb. As Act. P/Os. on probn.:—(Feb. 21) C. J. G. Austin, P. K. Brown, D. L. Butt, H. C. Daynes, G. E. Swindell, C. J. Thomas, P. C. Thornely, E. C. C. White, H. L. Williams, W. P. Wishlade. L.A/C.: (Feb. 21) C. A. Heathcote.

The follg. P/Os. on probn. are confirmed in their appts. and promoted to war substve. rank of F/O.:—(Sept. 19, 1940) J. T. Lean; (Jan. 3) R. Maine; (Jan. 11) H. W. Scott; (Jan. 27) R. Stallebrass; (Feb. 1) T. F. Bullus; (Feb. 3) H. W. R. Trigg; (Feb. 16) T. T. Brown, J. W. Davies, G. F. Turner; (Feb. 19) C. R. Guy; (Feb. 25) L. S. Wigdortchik.

The follg. F/Os. are granted war substve. rank of Flt. Lt.:—(Nov. 19, 1940) G. W. Adams, H. B. Dent.

The follg. P/Os. are granted war substve. rank of F/O.:—(May 25, 1940) H. L. Assig; (Aug. 9, 1940) C. S. Jones; (Sept. 12, 1940) H. V. Pexton.

Balloon Branch.

P/O. on probn. J. S. White is confirmed in his appt. Sept. 28, 1940, and promoted to war substve. rank of F/O. (Feb. 5).

The follg P/Os. on probn. are confirmed in their appts. and promoted to war substve. rank of F/O.:—(Feb. 17) M. E. Cauvin, R. C. B. Thackeray, K. J. F. Toop; (Feb. 19) W. S. Brown, H. W. G. L. England, D. N. Lowe; (Feb. 21) H. Edwards, P. A. Feeny, C. d'E. Trevelyan; (Feb. 23) C. F. Fowler; (Feb. 26) J. M. M. Bloor, J. A. Forgie, B. J. Dodridge, J. F. Taylor; (Feb. 27) E. A. Gorton; (Feb. 28) R. T. Sutton; (Feb. 29) J. Raven; (Mar. 1) R. J. V. Falkner, M.C.; (Mar. 1) R. A. Rogers; (Mar. 2) J. A. Perkins; (Mar. 4) F. C. Preston, J. B. Tanner, A. G. White, E. P. Whitehorn; (Mar. 6) A. M. Morgan, F. W. Wentworth-Shields; (Mar. 7) A. J. Warren; (Mar. 10) S. P. Gough; (Mar. 11) G. W. Hodgson, R. R. Smith; (Mar. 18) C. Metcalf, T. W. Williams, H. D. Wyatt.

The follg. P/Os. are promoted to war substve. rank of F/O (Feb. 5):—H. W. Bennett, B. C. Bloor.

Administrative and Special Duties Branch.

Maj. D. Hodson (S.U.L.I.A.) is granted a commn. as Flt. Lt. (Feb. 24, sen. May 26, 1939).

The follg. are granted commns. for duration of hostilities as P/Os. on probn.:—(June 30, 1940) H. V. Budgen, (Sept. 25, 1940) E. S. Roberts; (Oct. 23, 1940) J. J. Alexandroff; (Dec. 7, 1940) A. V. Day, R. A. Murcutt; (Jan. 24) G. G. Cradock-Watson, C. A. S. Thompson; (Jan. 31) J. A. Grieves; (Feb. 1) W. R. Heaton; (Feb. 6) H. Ezekiel; (Feb. 7) C. L. Tedder; (Feb. 12) P. F. Bee; (Feb. 14) W. Roan; (Feb. 18) M. V. Lambert; (Feb. 19) S. F. Downer, W. V. Noble; (Feb. 20) C. A. B. Young; (Feb. 21) F. E. G. Aldous, R. V. Anderson, R. Bailey, G. Beeby, I. S. Bellis, V. Borch, H. W. B. Bray, E. L. Bryan, M. J. H. Bunney, J. A. Carney Smith,

CATASTROPHIC CARGO. Three of those "big, beautiful bombs" in one of the special bomb-loading dinghies, fitted with an 8/28 h.p. Power Meadows engine, which the R.A.F. use for transporting "seabirds' eggs" to Sunderlands and Lerwicks.

SERVICE AVIATION (Continued)

The Hon. L. Cary, Master of Falkland, W. E. C. Coombs, W. F. Copland, O. D. G. Creegan, G. Dawe, R. H. Q. Edwards, F. W. Eldred, R. L. V. Fletcher, L. B. Foskett, J. R. R.-C. Foulerton, J. H. Gorman, A. G. S. Grant, J. K. Hill, A. C. Hilditch, J. W. G. Howlett, R. J. Hunt, S. R. Hyatt-Twynam, C. H. James, A. E. H. Killick, R. S. King, C. V. Lewin, J. F. Manning, H. G. R. March, G. A. McPartlin, P. D. S. Mealing, L. Norriss, G. Richardson, J. R. T. Richardson, G. W. Rodney, W. V. Roe, C. M. Skerrett-Rogers, E. J. St. L. Strachey, R. M. Tate, F. Tomlinson, E. Trillwood, J. K. Varvill, M.C., A. T. Warburton, F. W. Whittick, A. C. Yates; (Feb. 22) V. A. Callan, E. B. Dorey, D. Morris, L. B. Newling, G. L. Pargeter, D.F.C., R. E. Prickett, F. P. Serginson, H. Smith, F. S. Speedy, K. E. D. Stone, R. C. Taylor, F. D. Thom; (Feb. 24) M. B. Cole, W. M. Jones, C. A. Pryce, F. R. Walker; (Mar. 3) B. M. Denham, F. J. Nurton, G. Ross, R. McE. Sutherland, E. C. White, E. I. E. Whitman. Cpl.: (Feb. 17) A. N. Simmons. As Act. P/Os. on probn.:—A/C 2: (Feb. 21) C. F. Tetley; (Feb. 22) H. R. Rayner; (Feb. 25) C. G. Dowson.

The follg. P/Os. on probn. are confirmed in their appts. and promoted to war substve. rank of F/O.:—(Sept. 16, 1940) G. Russell; (Sept. 19, 1940) W. R. Vaughan; (Nov. 7, 1940) W. Mann; (Dec. 2, 1940) D. B. Pinkney; (Dec. 27, 1940) G. W. Manton; (Jan. 4) The Hon. E. A. Akers-Douglas; (Jan. 8) W. A. Nayler; (Jan. 15) M. J. Lemaire; (Jan. 16) D. N. Kendall; (Jan. 22) J. A. Keep; (Jan. 26) H. A. Grass; (Feb. 1) R. J. Mackay; (Feb. 6) J. E. M. Stubbings; (Feb. 8) R. E. E. Barton; (Feb. 9) W. A. Vickers; (Feb. 10) M. H. C. Slaytor; (Feb. 11) P. E. Lawrie; (Feb. 12) D. C. S. Bland, J. E. Buckland; (Feb. 14) E. Lister, T. P.-W. Young; (Feb. 15) J. O. Barclay, A. E. Charlwood, L. T. Smith; (Feb. 16) H. Darby-Bowman; (Feb. 20) O. G. Williams, G. E. M. Bennett, J. K. Dick-Cleland, G. D. Jenkins, R. G. Spencer; (Feb. 22) W. L. Wood; (Feb. 23) H. E. R. Morris, G. W. Murray, C. Ralph, A. J. Jewell; (Feb. 25) D. W. McDermott; (Feb. 26) W. C. Garrett-Petts, B. A. Leigh, H. Tempest, G. E. L. Woodhouse, L. J. Bailey, M. C. M. Peters.

The follg. P/Os. are granted war substve. rank of Flt. Lt.:—(Dec. 3, 1939) T. C. Wells, O.B.E., M.C.; (Dec. 9, 1939) C. Bray, W. Munro; (Dec. 11, 1939) C. D. Kissack, T. H. Wisdom; (Jan. 7, 1940) N. W. Barrymaine, R. McColl; (Feb. 2, 1940) E. Fletcher-Allen; (Feb. 6, 1940) A. W. Haslett; (Feb. 20, 1940) J. K. Silver; (Feb. 24, 1940) A. C. Jones; (Sept. 28, 1940) D. A. Davies, D.F.C.

The follg. P/Os. are granted war substve. rank of F/O.:—(Dec. 9, 1939) J. G. Campbell, S. F. Tolman; (Dec. 20, 1939) W. T. S. Williams, D.S.C.; (Dec. 21, 1939) R. A. Wyatt; (Jan. 8, 1940) F. R. R. Kaye; (Jan. 17, 1940) R. F. Potter; (Jan. 18, 1940) E. M. Malone; (Jan. 20, 1940) W. L. Stewart, K. P. Atkinson, M.C.; (Jan. 23, 1940) L. V. Labrow, F. A. Rice; (Jan. 26, 1940) E. N. Clifton; (Jan. 28, 1940) J. L. Luntley, H. A. Moncrieff; (Feb. 17, 1940) D. G. Nairn; (Feb. 22, 1940) R. D. Coath; (Feb. 23, 1940) C. W. Snook; (Mar. 17, 1940) G. P. M. Davis; (Mar. 26, 1940) A. G. Pinkney; (April 2, 1940) G. W. P. Davidson; (April 14, 1940) S. G. M. Bowman; (April 21, 1940) B. Travers; (May 3, 1940) W. L. Alderson, C. H. Dunster; (May 10, 1940) S. R. K. Glanville; (May 23, 1940) The Hon. E. W. C. Russell, A. W. H. Longstaff; (May 27, 1940) J. G. Ridout-Evans; (June 6, 1940) J. B. Lacy; (June 7, 1940) P. G. Goodger; (June 15, 1940) L. H. F. Irving; (June 19, 1940) W. L. Minter; (June 23, 1940) B. Drewe, M.C., C. H. A. A. Hankey, R. H. Cholmondeley; (June 29, 1940) J. B. H. Atherton; (July 5, 1940) M. Banks; (July 10, 1940) V. E. Mearles; (July 16, 1940) A. C. Godfrey; (July 20, 1940) A. E. Croughley; (July 22, 1940) A. P. Morley, P. C. I. Elderton; (July 24, 1940) L. W. Terry; (Aug. 1, 1940) A. A. Bartram; (Aug. 6, 1940) H. Buie; (Aug. 28, 1940) J. D. Christopher; (Sept. 10, 1940) N. N. McKinnon; (Sept. 15, 1940) R. E. Heath; (Sept. 18, 1940) N. A. Lindley; (Sept. 26, 1940) C. N. Pollock; (Oct. 1, 1940) N. S. Jenks; (Oct. 21, 1940) W. A. Sime; (Nov. 9, 1940) K. R. Riddell, C. E. St. J. Evers; (Nov. 16, 1940) A. D. Nunweek; (Nov. 20, 1940) H. Nichols; (Dec. 18, 1940) P. G. Child; (Dec. 24, 1940) C. B. Bond; (Jan. 1) H. H. Rose, W. T. Windeler, A. C. G. Menzies; (Jan. 6) J. M. S. Roberts; (Jan. 18) L. A. Smith.

P/O. on probn. M. W. Turner is transld. to General Duties Branch (Oct. 14, 1940).

The follg. are transld. to Technical Branch:—F/Os.: (Oct. 6, 1940) J. W. W. Whitehead; (Oct. 25, 1940) G. E. Johnson. F/O. on probn.: (Dec. 16, 1940) A. I. Bray. P/Os.: (Aug. 14, 1940) J. F. R. Martin; (Sept. 9, 1940) W. Cunniffe, H. R. Bunn. P/Os. on probn.: (June 25, 1940) R. W. Sawyer; (July 28, 1940) T. A. Blanco-White (Aug. 14, 1940) R. Maine; (Sept. 10, 1940) F. R. Povey; (Sept. 17, 1940) H. A. Druce; (Sept. 23, 1940) W. F. Jordan; (Sept. 28, 1940) G. Knight, G. L. Holloway; (Oct. 2, 1940) C. M. Alzal; (Oct. 3, 1940) A. F. Thorpe; (Oct. 4, 1940) T. V. Smith; (Oct. 23, 1940) C. L. Wiggins; (Oct. 28, 1940) C. H. Wood, H. D. Wells, J. T. Main; (Nov. 24, 1940) A. S. Carr, M. T. Woodcock; (Nov. 25, 1940) H. Brook, P. R. Major, A. T. Shawcross; (Dec. 16, 1940) A. I. Bray; (Dec. 21, 1940) W. Lomax, S. A. Parry, J. MacN. Kellas, A. W. L. Burke, C. V. T. Campbell, D. A. Cowlett, T. A. Charlesworth, J. L. Burgess, H. V. Stead; (Feb. 2) W. C. Marshall, F. W. Wilder. P/O. on probn. J. C. Mitton is transld. to Accountant Branch (Jan. 29).

The follg. P/Os. on probn. relinquish their commns. on account of ill-health:—(March 12) A. E. L. Mackenzie-Grieve; (March 13) B. Cane; (March 18) T. N. Jones.

The comms. of the follg. P/Os. on probn. are terminated on cessation of duty:—(March 6) M. J. Lipsey; (March 9) B. H. Breay.

Errata.

In notifn. of Feb. 14 concerning C. B. White, *for* White *read* Wright.

Training Branch.

The follg. are granted commns. for duration of hostilities as Act. P/Os. on probn. (Feb. 1):—A. E. Hancox, H. J. Lane, G. A. Salomon, H. A. T. Simmonds, W. J. Stevens, F. G. Tolman.

Meteorological Branch.

A. H. Gordon is granted a commn. for duration of hostilities as Act. P/O. on probn. (Feb. 4). (Substd. for notifn. of Feb. 14).

P/O. on probn. R. W. Hatcher is confirmed in his appt., Sept. 12, 1940, and promoted to war substve. rank of F/O. Jan. 15.

The follg. P/Os. on probn. are confirmed in their appts., Oct. 3, 1940, and promoted to war substve. rank of F/O. Jan. 15:—K. M. Cripps, T. Crossley, G. Hastie.

Equipment Branch.

The follg. are granted commns. for duration of hostilities as Act. P/Os. on probn.:—(Jan. 24) A. B. Dale; (Feb. 28) G. H. Bedford, J. McN. Brock, D. W. Burgess, H. McD. Cameron, D. G. Cowling, C. S. Crawford, C. D. E. Davis, F. P. Endersby, W. F. Foster, G. F. Gange, F. C. C. Godbeer, D. Grant, L. B. Harvey, H. M. Hughes, H. M. Hutt, A. F. Jones, R. J. Kinsey, P. G. Kirkaldy, M. A. Liddell, J. H. Neep, H. C. O'Dell, G. Poulton, M. F. Revie, C. D. Rothwell, R. C. Sandwith, H. J. Shuttleworth, L. J. Titchmarsh, R. B. Waller. L.A/C.: (Feb. 28) R. Watson.

The follg. P/Os. on probn. are confirmed in their appts. Nov. 21, 1940, and promoted to war substve. rank of F/O., Feb. 2:—C. R. Pottinger, G. B. Thomas.

Act. P/O. on probn. J. J. Walsh is graded as P/O. on probn. (Feb. 1).

The follg. P/Os. are granted war substve. rank of F/O.:—(Dec. 20, 1939) A. H. Seymour-Gobbitt, for notifn. of March 19, 1940); (April 10, 1940) M. H. Seymour; (May 6, 1940) A. C. Flavell; (May 10, 1940) H. M. D. Davis; (July 8, 1940) L. S. N. B. Faulkner.

Accountant Branch.

The follg. Act. P/Os. on probn. are graded as P/Os. on probn.:—(Aug. 11, 1940) H. G. North; (Sept. 4, 1940) J. W. Grey, L. H. Rattenbury, A. H. Nelson; (Sept. 6, 1940) J. M. Wells; (Nov. 2, 1940) K. Gummersall; (Jan. 25) A. E. Cheshire, F. J. Dryden; (Feb. 15) F. H. Buck.

The follg. P/Os. are granted war substve. rank of F/O.:—(Dec. 18, 1939) C. W. Myring; (Sept. 9, 1940) E. G. Fish; (Oct. 27, 1940) W. G. Haydon.

Medical Branch.

The follg. F/Os. are promoted to war substve. rank of Flt. Lt.:—(Nov. 15, 1940) K. W. Monks, M.R.C.S., L.R.C.P.; (Feb. 6) J. W. Cope, M.B., B.Chir., F.R.C.S., T. B. Purdy, M.B., Ch.B., A. G. Turner, M.R.C.S., L.R.C.P.; (Feb. 13) F. J. C. Matthews, M.R.C.S., L.R.C.P., R. G. Record, M.B., Ch.B., M.R.C.S., L.R.C.P., D.R.C.O.G., E. L. Rees, L.R.C.P. and S.; (Feb. 20) C. A. C. O'Connor, M.B., B.Ch.

The follg. F/Os. relinquish their commns. on account of ill-health:—(Aug. 17, 1940) A. G. B. Gavin, M.C.; (March 18) G. J. Waters.

Errata.

In notifn. of Feb. 4 concerning J. H. Hunt, M.R.C.S., L.R.C.P., M.D. *For* M.R.C.S, L.R.C.P., M.D., *read* M.D., B.Ch., M.R.C.P.

In notifn. of Feb. 4 concerning K. A. Latter, M.R.C.P., M.D. *For* M.R.C.P., M.D., *read* M.D., B.S., M.R.C.P.

Auxiliary Air Force

General Duties Branch.

The follg. F/Os. are promoted to war substve. rank of Flt. Lt.:—(Jan. 18) B. H. Bowring; (Feb. 3) H. N. Ross.

The follg. P/Os. are promoted to war substve. rank of F/O.:—(Dec. 1, 1940) J. Robinson, G. H. E. Welford; (Dec. 2, 1940) A. C. MacLaren; (Jan. 11) The Hon. P. I. Cunliffe-Lister.

Technical Branch.

P/O. J. A. Killick is granted war substve. rank of F/O. (May 19, 1940).

Balloon Branch.

The follg. P/Os. are promoted to war substve. rank of F/O.:—(Nov. 1, 1940) H. D. S. Heaver; (Feb. 5) G. J. Barnes.

The follg. P/Os. are granted war substve. rank of F/O.:—(Dec. 7, 1939) A. S. Furniss; (April 15, 1940) R. S. Angus, E. L. Bickle.

Administrative and Special Duties Branch.

P/O. F. G. Bowling is granted war substve. rank of F/O. (June 18, 1940).

P/O. J. A. Killick is transld. to Technical Branch (April 24, 1940).

Auxiliary Air Force Reserve of Officers

General Duties Branch.

Flt. Lt. G. F. Anderson is promoted to rank of Sqn. Ldr. (temp.) March 1.

F/O. M. T. Harraway is promoted to war substve. rank of Flt. Lt. (Feb. 26).

Women's Auxiliary Air Force

The follg. are appointed Assist. S/Os.:—(March 8) A/CW.2 B. K. Blakiston Houston, A/CW.2 O. M. Clark, A/CW.1 M. B. Rivett, A/CW.1 M. W. Russell, A/CW.2 J. C. Sinclair, A/CW.2 M. M. Thornycroft; (March 10) A/CW.1 M. F. Angus, Cpl. E. A. D. Anthony, Cpl. M. Ayre Smith, A/CW.1 L. F. Bell, A/CW.2 J. M. B. Green, A/CW.1 L. L. Grimley, Cpl. J. S. Grogono, A/CW.1 P. Henesey Smith, A/CW.1 I. E. Hope Murray, Cpl. J. D. Kelly, A/CW.2 J. M. Kidson, Cpl. B. E. Leighton, Sgt. E. M. Manly, A/CW.2 D. McF. Petters, A/CW.2 E. C. Pharall-Smith, A/CW.2 P. G. Playford, Sgt. M. M. Roberts, A/CW.1 E. M. Sex, Cpl. R. Walker, Sgt. J. M. Winks.

The follg. Assist. S/Os. relinquish their appts.:—(June 2, 1940) M. E. B. Whittingham-Jones; (Jan. 24) M. E. McN. Murray Threipland; (Feb. 22) P. Smith; (March 8) A. M. Fellowes.

Flt. Officer F. E. Murray Agnew relinquishes her appt. on account of ill-health (Feb. 26).

UP TO HER TRICKS. Entertainment is a prominent feature at a certain West Country training centre, and its organisation is in the hands of a corporal who was previously a London theatrical producer. Here we see a W.A.A.F. sergeant showing her act at an audition to discover "local talent."